Vermont
Airport System and Policy Plan

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Executive Summary

INTRODUCTION

The Vermont Airport System and Policy Plan provides the Vermont Agency of Transportation (VTrans) with updated airport system planning products, policy recommendations, and a framework for evaluating the State's aviation infrastructure needs. This plan was conducted in a manner consistent with the Federal Aviation Administration's (FAA) Advisory Circular 150/5070-7, *The Airport System Planning Process.* The FAA was one of the primary sources of funding for this plan. The Airport System and Policy Plan will be used by VTrans and airport sponsors to guide development of airports in Vermont in the coming years.

The preparation of the Vermont Airport System and Policy Plan included several components:

- Airport System Plan
- Policy Plan
- Information Management System Review
- Photoslope Analysis
- Rates and Charges Overview
- Acoustical Counting Review

The Information Management System Review and Photoslope Analysis are tools used by VTrans in their day-to-day airport and data management processes. These updated tools assist in the assurance that the existing State-owned airports are adequately maintained and that the State's broad roles in aviation are conducted in an efficient, effective manner.

An Airport System Plan provides a top down, statewide analysis of the entire system's needs and ability to adequately serve the entire state. Airport master plans serve as the local planning resources, analyzing needs from the "bottom up". The meeting point of the two studies is in the capital development planning process wherein individual airport needs are considered in the larger, statewide framework to provide for long-term development of a balanced, well-served statewide aviation infrastructure that incorporates principles of asset management.

The Policy Plan uses the framework developed for the System Plan, which analyzed the airports roles and needs, and recommends policies to promote the long-term viability and effectiveness of Vermont's airport system.

SYSTEM PLAN PROCESS

The Airport System and Policy Plan was developed with the assistance and reviews of a study advisory committee and the Governor's Vermont Aviation Advisory Council. The initial steps of the study process included establishing goals, identifying performance measures and benchmarks to later measure the performance of the existing system, and establishing factors to stratify airports into functional roles within the State's Airport System. The next steps included completing an inventory of airport facilities and aviation activity, forecasting future aviation demand, identification of facility and service objectives for each of the functional airport roles, and evaluating the current system to identify adequacies, deficiencies, and overlaps. Needs are then identified to meet the objectives for each functional role, and costs for infrastructure, facility, and service enhancements are determined.

EXISTING AIRPORT SYSTEM

The Vermont airport system is comprised of 17 public-use facilities, ranging in size from small, single turf runway facilities to a larger, international airport. Airports in Vermont are currently classified according to the FAA's definitions as either general aviation (GA) or commercial service (CS). Thirteen of the State's 17 airports are currently included in FAA's National Plan of Integrated Airport Systems (NPIAS). The NPIAS identifies airports on the national level that are significant to the national air transportation system and classifies them as either Commercial Service (CS) or

General Aviation (GA). In order for an airport to obtain federal funding from the FAA, it must be included in the NPIAS.

Vermont's system of 17 public-use airports includes 10 State-owned airports, 2 municipally owned airports, and 5 privately owned airports. The ownership is an important consideration as privately owned airports do not typically receive federal or State funding to assist with capital development needs.

Airport Roles

For system planning purposes, the 17 public-use airports in Vermont were grouped into one of four functional levels based on their current facilities/condition and contribution to the State's airport system. The four roles and their functions include the following:

- **National Service Airports** accommodate the highest level of GA activity and connect the local, regional, and statewide economy to the national and global economy.

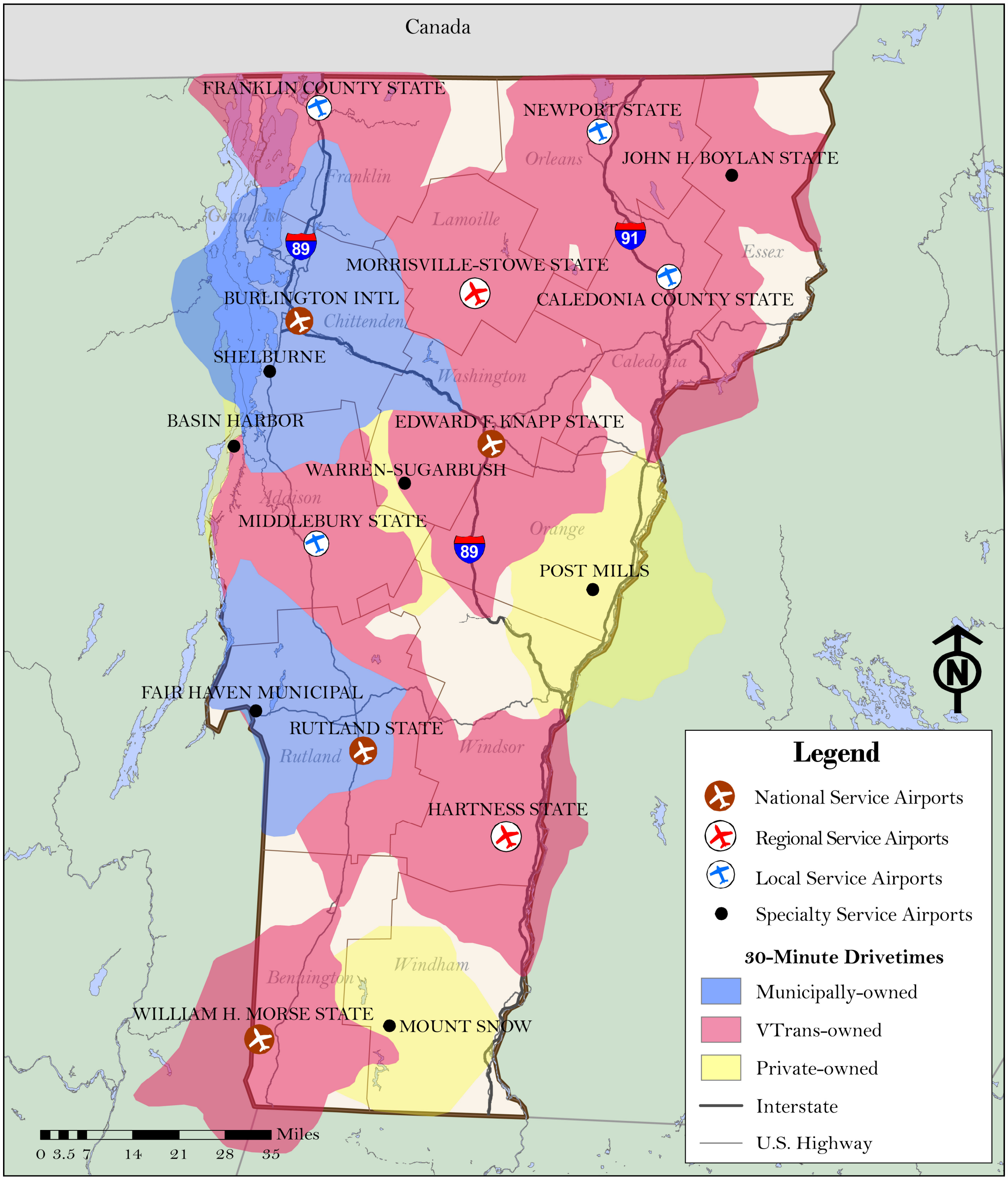
- **Regional Service Airports** serve primarily GA aircraft, with a focus on business activity, support small jet and multiengine aircraft, and connect the local and regional economies to the State and national economies.

- **Local Service Airports** primarily serve recreational and personal flying activity, support the local economy, serve some corporate/business flights, provide flight training, and provide maintenance, fuel, storage and facilities for piston-driven single and multi-engine aircraft.

- **Specialty Service Airports** provide aviation services for smaller single-engine aircraft and other non fixed-wing aircraft such as ultra-lights, gliders, and balloons. Some are seasonally closed in winter.

Each of these roles serves a purpose within the Vermont Airport System, with the 17 airports providing aviation access to Vermont's business and leisure travelers. The 17 airports, their respective ownership and roles, and 30-minute drive times from each airport are depicted below.

Airport Ownership, Roles, and 30-Minute Drive Time Areas



The following table summarizes the public-use airport system of Vermont as well as each airport's recommended functional role within the Vermont Airport System:

Summary of Current System

Airport Name	City	Airport Identifier	Ownership	Level of Service	NPIAS	Functional Role
Basin Harbor	Vergennes	B06	Private	GA	---	Specialty
Burlington International	Burlington	BTV	Munic. (City of Burlington)	CS	Primary CS	National
Caledonia County State	Lyndonville	6B8	Public (VTrans)	GA	GA	Local
Edward F. Knapp State	Barre/Montpelier	MPV	Public (VTrans)	GA	GA	National
Fair Haven Municipal	Fair Haven	1B3	Munic. (Town of Fair Haven)	GA	GA	Specialty
Franklin County State	Highgate	FSO	Public (VTrans)	GA	GA	Local
Hartness State	Springfield	VSF	Public (VTrans)	GA	GA	Regional
John H. Boylan State	Island Pond	5B1	Public (VTrans)	GA	---	Specialty
Middlebury State	Middlebury	6B0	Public (VTrans)	GA	GA	Local
Morrisville-Stowe State	Morrisville	MVL	Public (VTrans)	GA	GA	Regional
Mount Snow	West Dover	4V8	Private	GA	---	Specialty
Newport State	Newport	EFK	Public (VTrans)	GA	GA	Local
Post Mills	Post Mills	2B9	Private	GA	GA	Specialty
Rutland State	Rutland	RUT	Public (VTrans)	CS	GA	National
Shelburne	Shelburne	VT8	Private	GA	---	Specialty
Warren-Sugarbush	Warren	0B7	Private	GA	GA	Specialty
William H. Morse State	Bennington	DDH	Public (VTrans)	GA	GA	National

Source: Wilbur Smith Associates

FUTURE DEMAND

As part of the System Plan, forecasts of aviation demand for a 20-year period, using 2005 as a base year, were prepared for both general aviation and commercial service activity:

GENERAL AVIATION FORECASTS

Year	Based Aircraft	Total General Aviation Operations*
2005	583	268,938
2010	610	280,800
2015	630	289,900
2025	668	306,800

COMMERCIAL SERVICE

Year	Operations*		Enplanements	
	Burlington International	Rutland State	Burlington International	Rutland State
2005	31,562	1,938	1,240,309	6,082
2010	33,784	2,800	1,723,000	9,440
2015	36,162	2,800	1,921,055	13,300
2025	41,433	2,800	2,394,908	13,300

* Note: an operation is either a single take off or a landing

Vermont's airport activity is projected to grow over the next 20 years; the facilities and services of the airport system will need to develop to meet the growing demand.

FACILITY AND SERVICE OBJECTIVES

For each role category, specific objectives were identified in the following categories:

- **Function** refers to the level of service (GA or CS) that an airport should offer, the population that it serves, and the scope to which they are served (international, national, regional, etc.).

- **Activity** refers to the type of aircraft used, the amount of service, as well as the level of service.

- **Facilities/Services** for airline passengers and pilots, such as fuel for aircraft, terminals with certain amenities, aircraft storage, parking, and airside and landside services.

- **Runway length** varies greatly from a minimum of 5,500 ft. for national service airports to 4,000 ft. for local service.

The facility and service objectives serve as the basis for examining how each airport fulfills its role in the statewide system. It is anticipated that not all airports will be able to meet the objectives identified for their role, but that the facility and service objectives would identify the optimum level of facilities and services that should be provided to meet the overall system goals/performance.

CURRENT SYSTEM PERFORMANCE

The performance of Vermont's airport system was evaluated according to measures in the following three performance categories:

- **Accessibility –** To provide a system of airports that is accessible from both the ground and the air
- **Development –** To provide an airport system that preserves and enhances existing infrastructure.
- **Safety & Security –** To promote a safe and secure system of airports

In terms of accessibility, the existing Vermont airport system was determined to provide coverage as noted in the following benchmarks:

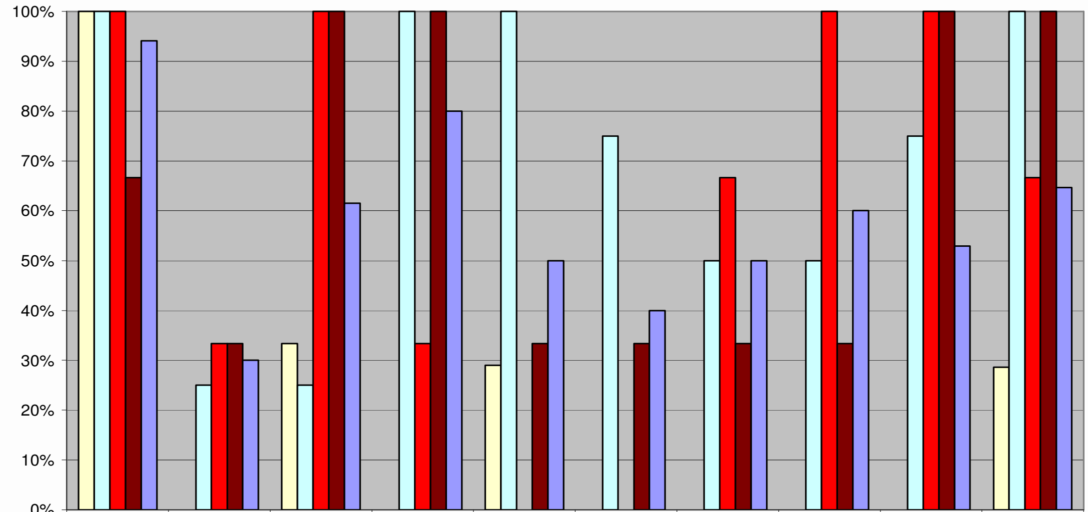
- 93% of population within 60-minute drive of commercial service airport
- 62% of population within 30-minute drive of airport with a 5,000-foot long runway
- 44% of population within 30-minute drive of airport with a 5,000-foot long runway with a precision instrument approach

This existing performance was determined to be good overall, but that improved accessibility was needed to provide Vermonters with an airport system that could meet business, recreation, and personal needs. A summary of accessibility is depicted by the map on page ES.4.

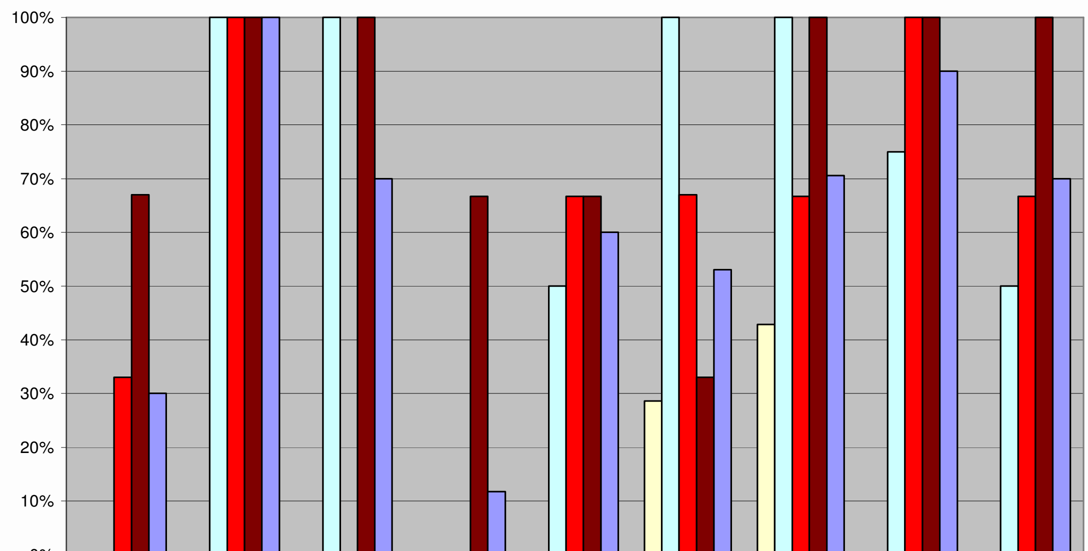
The development performance measure examined in depth the ability of each airport to meet facility and service objectives that were established for each airport role. The analysis of the system's existing performance provides a baseline for determining the needs of the system. In addition, issues such as compatible land use, adoption of airport-related zoning, and airport planning were considered as part of the development performance analysis. Some of the development measures are depicted by the charts on page ES.9.

Detailed analysis of the safety and security performance measure was not conducted at this time. VTrans is currently undergoing a review and evaluation of each airport to determine its ability to meet FAA standards, as well as develop guidelines to meet new and constantly changing federal security needs.

PERFORMANCE MEASURE: DEVELOPMENT - FACILITIES AND SERVICES



	ARC	Runway Length	Runway Width	Runway Strength	Taxiway	Approach	NAVAIDs	Lighting	Weather	Ground Comm.
Specialty	100%		33%		29%				0%	29%
Local	100%	25%	25%	100%	100%	75%	50%	50%	75%	100%
Regional	100%	33%	100%	33%	0%	0%	67%	100%	100%	67%
National	67%	33%	100%	100%	33%	33%	33%	33%	100%	100%
System	94%	30%	62%	80%	50%	40%	50%	60%	53%	65%



	Covered Storage	Aircraft Apron	GA Terminal	Fencing	Auto parking	Fuel	FBO	Maintenance	Ground Trans.
Specialty				0%		29%	43%		
Local	0%	100%	100%	0%	50%	100%	100%	75%	50%
Regional	33%	100%	0%	0%	67%	67%	67%	100%	67%
National	67%	100%	100%	67%	67%	33%	100%	100%	100%
System	30%	100%	70%	12%	60%	53%	71%	90%	70%

Future System Analysis

Based on the evaluation of the existing system's performance in comparison to the stated objectives, it was determined that additional coverage was needed to provide Vermont's businesses and recreational interests with access to airports that can accommodate their demand by larger aircraft. Consideration of strategic runway extensions and improved approaches at key airports should be undertaken to increase accessibility throughout Vermont. By providing key airports with the capability of accommodating larger aircraft, more of Vermont's residents and businesses will have access to these types of facilities, providing an opportunity for increased economic activity throughout Vermont.

Through an analysis of future airport demand and performance, specific projects were identified for each of Vermont's airports. This analysis provides a menu of projects and their associated costs for airport owners to consider over the 20-year planning period. It is important to note that these needs may not reflect those of each airport's individual planning efforts.

Of the total identified needs, approximately 91% could be funded with FAA grant assistance, while the remaining project funding would need to be provided by the State and other airport owners over the 20-year period.

Policy Plan

The Vermont Airport System and Policy Plan uses a strategic approach to identify and evaluate the needs of the Vermont airport system over the next 20 years. The Policy Plan uses the framework developed for the System Plan, which analyzed the airports' roles and needs, and recommends policies to promote the long-term viability and effectiveness of the Airport System.

Role of Aviation in Vermont

As a key component of the State's transportation infrastructure, the Vermont Airport System's role is to provide access to the national air transportation system. The Vermont Airport System should serve to:

- Provide access from both the ground and the air
- Preserve and enhance existing infrastructure (asset) investments
- Promote a safe and secure system of airports
- Support economic activity throughout the State
- Integrate with the local, regional, and national transportation systems

- Prepare for future transportation needs through new technology
- Promote aviation education
- Promote compatible land use
- Promote health, safety, and emergency services

VISION OF VERMONT'S AIRPORT SYSTEM

Each of Vermont's airports serves a unique role in the State system. While each airport serves its own local or regional marketplace, together, the State's airports fulfill an important role in connecting Vermonters to the national and international air transportation system, while also providing access for business and other visitors to Vermont. Airports are used to transport persons and freight in a timely manner, providing the quickest form of transportation. With this in mind, the vision for the Vermont airport system has been defined as:

> "Vermont's airport system will be accessible, safe and secure, meeting the needs of its business and recreational users, including implementing new technologies to support the future system. The airport system will be preserved and enhanced, while meeting Federal and State guidance and promoting responsible environmental stewardship and land use compatibility. Vermont's airports will be operated as business-oriented facilities focusing on creating opportunities for a return on the investment and will provide intermodal linkages to national transportation systems."

In order for Vermont's airport system to meet this vision, goals and policies need to be established and implemented.

AVIATION MISSION FOR THE AGENCY OF TRANSPORTATION

The Vermont Agency of Transportation's aviation mission is to support, maintain and enhance the 10 State-owned airports. As the owner/operator of 10 State-owned airports, VTrans promotes efficient and effective operation of its airports to assure safe, secure, and reliable air transportation of goods and people, while being environmentally responsible, cost-effective and supportive of Vermont's economy and recreational activities. Emergency services, aviation education, financial responsibility, and promotion of compatible land use are part of the mission for VTrans, as is playing a supportive role to all airports and aviation statewide.

VTRANS AVIATION GOALS

As part of the Airport System Plan, goals and associated performance measures were identified to guide Vermont's airport system development and establish the framework for the Plan. These goals have been supplemented by additional goals related to policy decisions that impact the maintenance and development of Vermont's airport system. The following goals will be sought to accomplish the mission of the airport system (not intended to be listed in priority order):

- Provide a system of airports that is accessible for people and goods from both the ground and the air throughout the State.
- Provide intermodal ground access opportunities and/or services such as rental car, taxi, bus, or bike.
- Preserve and enhance Vermont's existing airport system's infrastructure investment through maintenance and rehabilitation to meet future growth and demand as well as providing new infrastructure to meet future needs in support of the national air transportation system when needed.
- Plan for future airport development and protect public investment in airports through promotion of compatible land use in the vicinity of airports.
- Provide a safe and secure system of airports that meets State and Federal guidelines, including routine inspections of airports such as the 5010 Program.
- Seek adequate and stable funding, including FAA assistance, and assure appropriate staffing to support the Agency's mission.
- Make timely, sound infrastructure investments derived from airport master plans and based on priorities that are determined through coordination with Vermont's aviation stakeholders, including use of the Vermont Airport Capital Facilities Program.
- Maintain commercial air service at Rutland State Airport and support its development elsewhere in the State, as well as encourage additional commercial and cargo services where appropriate.
- Maintain an up-to-date integrated database of air and landside facilities including capital plans and improvements, leaseholds, contacts, relevant zoning as well as the system's performance measures.

- Strive to generate appropriate revenues from the operation of the State-owned airports in support of their continued operation and expansion utilizing a business-oriented approach.

Recommended Aviation Policies

In order for the Airport System and Policy Plan to be effective, policies must be established that relate the goals of the aviation system to implementation strategies. Goals were used explicitly throughout the Airport System Plan to derive recommendations related to future airport needs and development of an integrated, comprehensive, technologically advanced, and sound capital development plan. These goals and the performance categories described in the Policy Plan are synonymous.

Based on the role, mission, and vision for Vermont's aviation system, as well as the evaluation of the performance of the system relative to the performance measures and review of the previous policies, the following aviation policies are recommended for VTrans.

It is State Policy to:

1. Advocate for the promotion of aviation and airports, including education of youth and flight training to promote sustainability in Vermont's aviation industry.
2. Maintain all 10 State-owned airports in order to keep them open and safe.
3. Maintain adequate access to public-use commercial and general aviation airports for all areas of Vermont.
4. Promote generating appropriate revenues from the operation of State-owned airports utilizing a business-oriented approach.
5. Promote development of facilities at State-owned airports in response to demand including tie-down areas and hangars, including associated surface access and utilities either with State or private funding.
6. Implement an updated computerized Airport Management System such as Airport IQ consistent with the Strategic Enterprise Initiative that is based on achieving the performance targets set for the aviation system, with a high priority given to the matching of available federal funds.
7. Support federal passenger Essential Air Service subsidies at Rutland State Airport and continued growth of passenger service at Burlington International Airport and encourage new passenger service development such as charter and other services through marketing and promotion.
8. Promote compatible land use near airports.

9. Utilize an asset management approach to ensure appropriate maintenance and investment in existing airport assets.
10. Seek adequate and stable funding and resources from all available sources to support the State's goals, mission and policies.
11. Promote airports as economic generators and catalysts.
12. Promote establishment of a statewide airports council to provide a forum for Vermont's airport operators, both public and private, to discuss current issues, activities, and processes to assist in enhancing Vermont's airport system.
13. Evaluate and seek changes to plans and facilities to respond to new technology and aircraft fleets to accommodate future air transportation system needs.
14. Encourage private use airports to consider transition to public use, if appropriate.

Aviation Performance Measures and Targets

Performance measures and targets for the different performance categories have been developed to evaluate the aviation system. It is important to note that there are several measures that can be used to evaluate progress on the goals established for the aviation system and several goals that may relate to the same measure. Each goal was considered to determine the best methods for evaluating the system's performance related to that goal.

The existing conditions related to each performance measure were derived primarily from analysis in the Airport System Plan. Based on the existing conditions, analysis of the potential for change as included in the Airport System Plan, discussions with VTrans staff, and consideration of similar performance in other state aviation systems, five-year targets were established for each performance measure. The Aviation System Performance Targets are presented below.

Performance Category	Associated Aviation System Goals		Performance Measures	Existing Conditions	5-Year Target
ACCESSIBILITY	A.	Provide a system of airports that is accessible for people and goods from the ground and air	Percent of Vermont's population and land area within 60-minutes of an airport with commercial service (Vermont and neighboring airports)	93% population 75% land area	Maintain existing standards
			Percent of Vermont's population and land area within 30-minutes of a 5,000-foot runway	62% population 75% land area	Increase to 70-75% population 80% land area
			Percent of population and land area exclusively served (within 30 minutes) by a privately-owned public-use airport	8% population 11% land area	Decrease to 5% population 10% land area
	B.	Provide intermodal ground access opportunities/services (such as rental car, taxi, bus, bike)	Percent of airports with intermodal opportunities/services	70%	Increase to 80%
DEVELOPMENT	C.	Preserve and enhance existing infrastructure investment through maintenance, rehabilitation and development of new infrastructure	Percent of system airports meeting corporate aviation-related facility and service objectives including runway length and width, taxiway type, approach, and fuel	44%	Increase to 50%
			Percent of system airports having a pavement condition index (PCI) of "good" or better	75%	Increase to 85%
	D.	Promote airport-compatible land uses	Percent of airports having local airport-related zoning	53%	Increase to 100%
			Percent of airports that are recognized in regional land use plans that include airport-compatible land uses in the airport environs	76%	Increase to 100%
SAFETY AND SECURITY	E.	Provide safe and secure system of airports that meets State and federal guidelines, including 5010 inspection program	Percent of airports meeting applicable FAA airport design standards	TBD	75%
			Percent of airports meeting applicable VTrans or TSA security-related recommendations	TBD	100%
			Percent completion of monthly safety inspections at all State-owned airports	100%	100%

Performance Category	Associated Aviation System Goals		Performance Measures	Existing Conditions	5-Year Target
FUNDING AND ECONOMICS	F.	Seek adequate and stable funding, including FAA assistance, and assure appropriate staffing to support the Agency's mission	Achieve block grant status with FAA	Conventional FAA funding	Achieve block grant status by 2010
	G.	Maintain and utilize Vermont's Airport Capital Facilities Program to make appropriate and timely investment decisions or project prioritization decisions	Implementation of updated computerized Airport Management System	TBD	Complete by 2009
	H.	Maintain Commercial Air Service at Rutland State Airport and support its development elsewhere in the state AND Encourage additional commercial and cargo services where appropriate	Number of airports with commercial air service and cargo activity	2 airports	2 airports
MAINTENANCE	I.	Maintain an up-to-date database on aviation facilities	Implementation of updated web-enabled database system that provides additional features including performance measurement tracking	Underway	Complete by 2008
	J.	Strive to generate appropriate revenues from the operation of the State-owned airports utilizing a business-oriented approach with the leases	Number of airport leases that have been updated with current rate structures	TBD	Increase by 3% annually

Chapter One: Study Overview and System Goals

Plan Purpose and Need

Vermont's Airport System is an integral component of the State's transportation network. The Airport System meets aviation and economic needs and links Vermont to the national transportation system. Aviation provides an important and efficient means of transportation for the movement of people and goods. The vision for the Vermont Airport System is to have safe, quality facilities and services that support transportation demand and meet economic development and quality of life needs in the State.

The Vermont Airport System and Policy Plan takes a strategic approach in identifying and evaluating the needs of the Vermont Airport System over the next 20 years. The primary goal of the system plan is to provide a framework that supports informed decisions related to planning and developing the State's aviation system. These decisions play an important role in assisting the Airport System to meet Vermont's needs.

Vermont's Airport System and Policy Plan will provide the Vermont Agency of Transportation (VTrans) with updated airport system planning products, policy recommendations, and a framework for evaluating the State's aviation infrastructure needs. The major elements of the study include:

- Airport System Plan – the system plan is conducted in a manner consistent with the FAA's Advisory Circular 150/5070-7, *The Airport System Planning Process*, dated November 10, 2004. The system plan culminates with a recommended development plan that identifies a prioritized, strategic approach for developing facilities at system airports to meet the goals and objectives defined for the system over the 20-year planning period.

- Policy Plan Update – the Policy Plan Update identifies policy-related recommendations that can improve the performance of Vermont's airport system and allow it to better meet the needs of system users and the State's citizens.

In addition, a review of the State's Airport Information Management System (AIMS), the compilation of data regarding instrument flight plans filed for Vermont airports, and a technical analysis of instrument approaches at the study airports were also completed in conjunction with the Airport System and Policy Plan.

The primary objectives of this update to the Vermont Airport System Plan are to:

- Identify and analyze aviation assets and needs of the State to assure that aviation performs the role needed for Vermont's economy and citizens.

- Provide continued guidance for development of a system of airports to meet the State's existing and future air transportation needs, identifying 5, 10, and 20-year projects and giving guidance to meet associated needs.

- Build consensus among public policy makers, airport sponsors and users so that the plan's recommendations can be more readily accomplished.

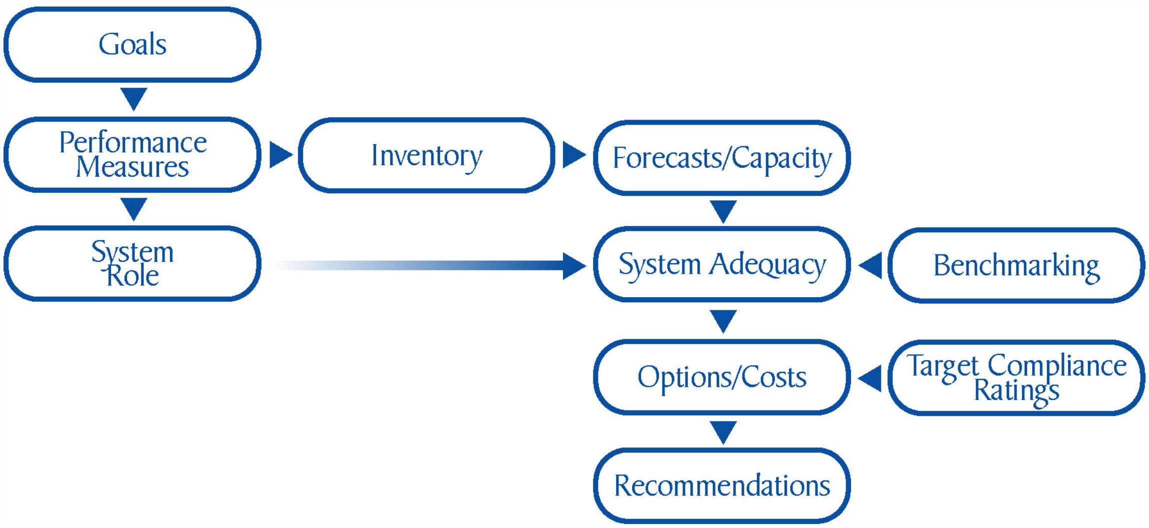
As part of the study process, system goals are established that describe an effective and efficient airport system for Vermont. These goals are translated into system performance measures and a series of benchmarks. The benchmarks are used subsequently to determine how well the existing system of public-use airports is currently performing. By employing a system benchmarking process, it is possible to evaluate Vermont's current public-use airport system and to identify its adequacies and deficiencies.

This process ultimately enables VTrans Aviation Division to identify projects that have the ability to move the Vermont airport system toward its established vision. The Airport System and Policy Plan will be used by the VTrans and airport sponsors to guide development of airports in Vermont.

SYSTEM PLAN PROCESS

The Vermont Airport System Plan is being conducted in a series of separate, but related, technical steps. The process is graphically depicted in **Exhibit 1-1**.

Exhibit 1-1
Study Process



Initially, the first three steps include the following:

- Establish goals for the airport system to meet needs over the next 20 years.

- Identify performance measures to assess the current performance of Vermont's existing airport system. To facilitate the evaluation process, benchmarks that are specific to each performance measure are used.

- Establish factors to define each airport's current functional role in the State airport system. All airports do not need to have equal levels of development; facility and service objectives for airports in Vermont are determined based on each airport's current and future role in the system. As part of the system plan, Vermont's public use airports are stratified into current functional roles. Ultimately, the functional role that each airport may fill in the future is identified based on system evaluation and analysis. The process of initial airport role assignment is addressed in Chapter Three.

Other steps in the system planning process are as follows:

- An inventory of the airports provides data on airport facilities and aviation activity. Inventory information is used in evaluating the current system and in identifying facilities that may be desirable. The inventory is also important in establishing each airport's current role in the system and evaluating current system performance.

- Forecasts, or projections of demand, are important when determining the system's ability to provide infrastructure to meet both current and future demand. Inventory data, as well as other demand driven components, are used to create the forecast of future aviation activity and to identify needed infrastructure. Demand projections consider information such as enplaned (boarding) passengers at commercial airports, based general aviation aircraft, and total annual operational levels at public use airports.

- The current system is evaluated to identify adequacies, deficiencies and overlaps. Facility and service objectives are identified for each functional level of airport. Airports should strive to attain their respective facility and service objectives, where possible, to achieve a system that meets State needs. Benchmarks used in this analysis are tied to performance measures. This step in the system plan culminates with the issuance of a "report card" for the Vermont Airport System.

- After the current system is evaluated, analysis is completed to determine what is needed for airports in Vermont to meet objectives established during the planning process. Costs for infrastructure, facility, and service enhancements are developed.

- Finally, a summary of findings and actions for Vermont to meet air transportation needs for the next 20 years is developed.

PLAN OUTREACH

Throughout the process, a collaborative effort is emphasized to obtain input and consensus on the study findings. Outreach and education are important and integral parts of the Airport System and Policy Plan. This outreach effort includes: System Plan Working Group; System Plan Advisory Committee; Regional Input Meetings;

and periodic collaboration with the Governor's Vermont Aviation Advisory Council. These efforts can be summarized as follows:

- The System Plan Advisory Committee provides input and guidance for the study. The committee consists of a subcommittee of the Governor's Vermont Aviation Advisory Council and the System Plan Working Group made up of VTrans staff. The System Plan Advisory Committee represents professional aviation, business, commercial and general aviation airports, government, and planning interests from across the State. This group meets at key project milestones to review and comment on the Airport System and Policy Plan.

- Regional Input Meetings were conducted near the conclusion of the study. The Regional Input Meetings provide an opportunity for interested parties to learn more about the System Plan and its recommendations and to allow input prior to finalization of the study. The times, dates, and locations for these meetings are provided on the VTrans Operations Division -Aviation Program's website and through various print and electronic media.

SYSTEM GOALS

The first step in the Vermont Airport System Plan is to identify specific goals for Vermont's airport system that can be used to direct the development of the system over the next twenty years. These goals help the system meet its established vision.

The System Plan Working Group met to discuss and identify goals for the system plan on June 16, 2005. At this meeting, specific goals for the system were identified and refined and system performance measures and associated benchmarks were established.

The following three goals and associated performance measures were identified and adopted to guide Vermont's airport system development and establish the framework for the Vermont Airport System Plan:

- **Accessibility –** To provide a system of airports that is accessible from both the ground and the air.

- **Development –** To provide an airport system that preserves and enhances existing infrastructure.

- **Safety & Security –** To promote a safe and secure system of airports.

System Performance Measures and Benchmarks

Performance measures, aligned with system goals, were identified. These performance measures are used to assess the current performance of Vermont's system of public use airports. For each performance measure, specific benchmarks were defined to identify adequacies, deficiencies, or potential surpluses in the current system.

Performance Measure: Accessibility

One goal of Vermont's aviation system is to provide a system of airports that is accessible from both the ground and the air. The ability of any airport system to meet the accessibility performance measure can be determined in several ways.

Ground accessibility can be measured by determining the coverage that system airports provide to all geographic areas of the State. The FAA standard of 30 minutes between NPIAS airports is used in the Vermont Airport System Plan to identify the percent of the State's population that is within a 30-minute drive time of various types of system airports and facilities. Accessibility to airports that provide coverage for a full range of the corporate/business general aviation fleet is an important system characteristic.

Air accessibility is also an important factor in measuring system performance. Airports that are equipped and capable of supporting operations in all weather conditions promote a system's air accessibility. Accessibility to airports from the air is increased by the presence of landing systems that enable aircraft to locate airports during periods of reduced visibility. System airports that have a precision approach offer the highest degree of accessibility, and airports with a non-precision approach provide a higher degree of accessibility from the air than do airports that are served only by a visual approach.

Benchmarks used to evaluate the system's ability to provide adequate air and ground accessibility include the following:

- Percent of Vermont's population and land area within 60 minutes of an airport with commercial service (Vermont and neighboring airports)

- Percent of Vermont's population and land area within 30 minutes of a 5,000-foot runway

- Percent of Vermont's population and land area within 30 minutes of a 5,000-foot long runway having a precision approach

- Percent of coverage provided by airports in each role category

PERFORMANCE MEASURE: DEVELOPMENT

Development of Vermont's aviation system should seek to preserve and enhance existing airport infrastructure. A good airport system should be adequately developed and planned, and provide airside and landside infrastructure and facilities to meet both current and future demand.

As part of the Vermont Airport System Plan, system airports are reviewed relative to facility and service objectives identified for their respective airport functional role category, as determined in Chapter Three. Established objectives for airfield pavement conditions for optimal use and safety are used in the Vermont Airport System Plan to evaluate the adequacy of the airport system as it relates to proper development and maintenance of airfield pavements.

Planning for future airport development and the ability to protect public investment in airports by controlling development around airports are important. Airports need to proactively plan for future development and implement land use planning guidelines to protect them from the encroachment of activities or land uses that are incompatible with their day-to-day operations. Proper planning on and around system airports generally increases the ability of the system to respond to development needs.

Specific benchmarks used to evaluate how well the aviation system is meeting the Development performance measure include:

- Percent of population and land area exclusively served (within 30 minutes) by a privately-owned airport

- Percent of system airports in each role category meeting facility and service objectives

- Percent of system airports in each role category having a PCI indices of "good" or better

- Percent of system airports in each role category with an Airport Layout Plan (ALP) that has been updated within the last 10 years

- Airport-related land use planning and zoning
  - Percent of airports in each category having local airport-related zoning
  - Percent of airports in each category that are included in regional land use plans that include airport-compatible land uses in the airport environs

PERFORMANCE MEASURE: SAFETY AND SECURITY

A third goal considered in this analysis is to provide a safe and secure system of airports. As part of the safety and security performance measure, the number of system airports that meet objectives related to addressing safety and security concerns is determined. Safety objectives include those established by the Federal Aviation Administration (FAA), VTrans, and the Transportation Security Administration (TSA). The current compliance of system airports to applicable airport design standards and security-related recommended practices are both evaluated in this performance measure.

To evaluate the adequacy of Vermont's airport system relative to applicable safety and security measures, the following benchmarks are used:

- Percent of airports meeting applicable FAA airport design standards
- Percent of airports meeting applicable VTrans or TSA security-related recommendations

OTHER POINTS

An important component of the Airport System Plan is to examine historic airport role categories used in the State, and if appropriate, recommend changes to the categories and identify the current role of each system airports.

Factors that could be considered in identifying current airport roles include:

- Data used in the Capital Facilities Program
- Recent findings of the economic impact study
- Existing airport facilities
- Airport activity levels

In addition, it is important that the Vermont Airport System and Policy Plan is informed by, and utilizes data from, the on-going FAA New England Regional Aviation System Plan (NERASP). Examples of data from the NE Regional Aviation System Plan that could be utilized include passenger forecasts produced for Burlington International Airport and general activity trends identified for the New England region.

NEXT STEPS

The groundwork established in this phase of the study is used to guide the remainder of the system plan. This chapter of the Vermont Airport System Plan provides a foundation for subsequent analysis. Information presented in this chapter is used to:

- Guide the collection of data and information at system airports during the inventory phase of the study.
- Determine how well Vermont's system of public use airports is currently performing.
- Identify where Vermont's airport system is currently adequate, as well as where it is presently deficient, or where overlaps may be present.
- Identify the need for change in the airport system to meet Vermont's future aviation needs.

Chapter Two: Inventory

INTRODUCTION

This chapter presents an inventory of aviation facilities at airports included in the Vermont Airport System and Policy Plan. The Vermont Airport System is comprised of 17 public-use facilities. There are also private-use aviation facilities in Vermont, but they are not included in the Airport System and Policy Plan because they are not open to public use. The public-use airports in Vermont range in size from small, single-runway facilities to larger, international airports. Primary factors determining the adequacy of Vermont's public-use airports are the facilities and services that each airport provides its users. Therefore, it is important to determine the physical attributes and services available at each airport.

This chapter of the Vermont Airport System Plan documents a general overview of existing facilities at each airport included in the State's system of public use airports. This information is provided primarily in the form of tables that present the information in a logical form for later use in the analysis.

STUDY AIRPORTS

As previously stated, Vermont's public-use airport system is comprised of 17 facilities. Vermont's Airport System is unique when compared to other states because 10 of the State's public-use airports are owned and operated by the Vermont Agency of Transportation (VTrans). Municipalities own two system airports and the remaining five are owned by private parties.

The system plan airports are:

- Basin Harbor
- Burlington International
- Caledonia County State
- Edward F. Knapp State
- Fair Haven Municipal
- Franklin County State
- Hartness State (Springfield)
- John H. Boylan State (Island Pond)
- Middlebury State
- Morrisville-Stowe State
- Mount Snow
- Newport State
- Post Mills
- Rutland State
- Shelburne
- Warren-Sugarbush
- William H. Morse State

Exhibit 2-1 presents the location of system plan airports and identifies the ownership type of each.

Vermont Airport System Plan

Public-Use Airport Location and Ownership

Exhibit 2-1

INVENTORY PROCESS

A variety of sources provide a wealth of data regarding the airports in Vermont's Airport System. Key data gathered in the inventory includes both airside and landside facilities, types of available approaches, based aircraft, and annual airport operations. This data provides the framework for analyzing the performance of the existing airport system relative to the goals and objectives developed for the system plan and summarized in Chapter One.

Relevant data for the system plan's inventory process was compiled from the following sources:

- Vermont Airports Directory
- VTrans Airport Information Management System (AIMS)
- Airport Facility Directory
- U.S. Terminal Procedures
- FAA 5010 Airport Master Record

The initial step of the inventory effort included compiling all available data for each system airport. Once the data was compiled, discrepancies in the various data sources were reviewed with VTrans staff to identify the most recent, valid, and correct data for each airport. The types of data discrepancies addressed in this process included verifying correct runway dimensions, current pavement conditions, and other specific data that is important to the system performance analysis.

AVIATION FACILITIES

To facilitate the presentation of data, airport inventory information has been compiled into tables that summarize the following general categories of airport data:

- Airport Overview
- Airside Facilities
- Airport Navigational Aids and Lighting
- Airport Landside Facilities

The following sections summarize the inventory of existing facilities at Vermont's public-use airports.

AIRPORT OVERVIEW

Table 2-1 presents the following data for each system airport:

- The associated city of each system airport
- Each airport's three letter/digit airport identifier at the time of the preparation of this document
- The current ownership, identified as public or private, of each public-use airport
- The current level of service of each airport. **Exhibit 2-2** also shows each airport and its current service classification, either commercial (CS) or general aviation (GA). Burlington International and Rutland State are the only airports in Vermont's system that are classified as commercial service. The remaining 15 airports are considered general aviation facilities[1].
- Airports currently included in the National Plan of Integrated Airport Systems (NPIAS), and for those included in the NPIAS, the airport's current NPIAS classification which is either Commercial Service or General Aviation

At the national level, the NPIAS identifies airports that are significant to the national air transportation system. The NPIAS is developed every two years by the FAA and presented to Congress to provide a five-year estimate of Airport Improvement Program (AIP) eligible development at NPIAS airports. The NPIAS is used by the FAA in managing and administering the Airport Improvement Program and supports the FAA's strategic goals for safety, system efficiency, and environmental compatibility by identifying the airport improvements that will contribute to achievement of those goals. Airports included in the NPIAS are classified as having a specific role within the national system. Thirteen of the State's 17 airports are in the NPIAS. These airports and their associated NPIAS role are graphically depicted in **Exhibit 2-3**.

[1] While Rutland State does have commercial airline service, the FAA's NPIAS classifies the airport as general aviation due to its passenger activity levels.

Table 2-1
Airport Overview

Airport Name	City	Airport Identifier	Ownership	Level of Service	NPIAS
Basin Harbor	Vergennes	B06	Private	GA	---
Burlington International	Burlington	BTV	Public (City of Burlington)	CS	Primary CS
Caledonia County State	Lyndonville	6B8	Public (VTrans)	GA	GA
Edward F. Knapp State	Barre/Montpelier	MPV	Public (VTrans)	GA	GA
Fair Haven Municipal	Fair Haven	1B3	Public (Town of Fair Haven)	GA	GA
Franklin County State	Highgate	FSO	Public (VTrans)	GA	GA
Hartness State	Springfield	VSF	Public (VTrans)	GA	GA
John H. Boylan State	Island Pond	5B1	Public (VTrans)	GA	---
Middlebury State	Middlebury	6B0	Public (VTrans)	GA	GA
Morrisville-Stowe State	Morrisville	MVL	Public (VTrans)	GA	GA
Mount Snow	West Dover	4V8	Private	GA	---
Newport State	Newport	EFK	Public (VTrans)	GA	GA
Post Mills	Post Mills	2B9	Private	GA	GA
Rutland State	Rutland	RUT	Public (VTrans)	CS	GA
Shelburne	Shelburne	VT8	Private	GA	---
Warren-Sugarbush	Warren	0B7	Private	GA	GA
William H. Morse State	Bennington	DDH	Public (VTrans)	GA	GA

Source: Wilbur Smith Associates

Vermont Airport System Plan

Public-Use Airport Service Classification

Exhibit 2-2

Vermont Airport System Plan

Airport Service Classification

Exhibit 2-3

AIRSIDE FACILITIES

Table 2-2 summarizes the airside facilities at each airport including runway designation, length, width, and surface type. Runways range in length from 1,950 feet at Fair Haven to 8,320 feet at Burlington International, the longest runway in Vermont's Airport System. The runways at most system airports are constructed of asphalt. There are several comprised of turf and one runway, at Fair Haven Municipal, is gravel.

In addition to the types of airside facilities at each airport, Table 2-2 includes information regarding the condition and strength of the runways. The FAA 5010 Airport Master Record reports runways being in the condition of either good (G), fair (F), or poor (P)[2]. Approximately three-fourths of the runways at public-use airports in Vermont are classified as being in good condition. The strength of a runway represents the amount of weight it can sustain based on different landing gear wheel-configurations. The strength of a runway is shown as a letter, representing the wheel-configuration; followed by a number expressed in thousands of pounds. Runway 15/33 at Burlington International, the longest runway in the State, is also the strongest in the State and is constructed of concrete. Runway 15/33 is able to accommodate aircraft weighing up to 355,000 pounds with dual-tandem (DT) landing gear, and 175,000 pounds for aircraft with dual-wheel (D) landing gear. Warren-Sugarbush has the weakest paved runway, and can only accommodate aircraft weighing 8,500 pounds or less with a single-wheel (S) configuration.

[2] "G" = Good Condition: 70-80% of the pavement may have some functional cracking that is properly sealed.
"F" = Fair Condition: 60-70% of the pavement may have functional cracking (unsealed joints& spalling).
"P" = Poor Condition: 50% or more of the pavement suffers from some form of structural distress (large open cracks, surface & slab spalling, vegetation through cracks and joints).

Table 2-2
Airside Facilities

Airport Name	City	Runway	Length	Width	Surface	Condition/PCI	Strength
Basin Harbor	Vergennes	2/20	3,000	90	Turf	Good	N/A
Burlington International	Burlington	1/19	3,611	75	Asphalt	Good	S-30, D-40, DT-60
		15/33	8,320	150	Asphalt-Grooved	Good	S-100, D-175, DT-355
Caledonia County State	Lyndonville	2/20	3,300	60	Asphalt	Good	S-12.5
Edward F. Knapp State	Barre/Montpelier	5/23	4,022	100	Asphalt	Good	S-30, D-46
		17/35	5,002	100	Asphalt	Fair	S-31, D-70
Fair Haven Municipal	Fair Haven	2/20	1,950	20	Gravel	Good	N/A
Franklin County State	Highgate	1/19	3,000	60	Asphalt	Good	S-12.5
Hartness State	Springfield	5/23	5,498	100	Asphalt	Fair	S-32, D-45
		11/29	3,000	75	Asphalt	Good	S-30
John H. Boylan State	Island Pond	14/32	2,650	120	Turf	Good	N/A
Middlebury State	Middlebury	1/19	2,500	50	Asphalt	Good	S-12.5
Morrisville-Stowe State	Morrisville	1/19	3,701	75	Asphalt	Fair	S-25
Mount Snow	West Dover	1/19	2,650	75	Asphalt	Fair	
Newport State	Newport	5/23	4,000	100	Asphalt	Fair	S-30, D-44
		18/36	4,000	100	Asphalt	Good	S-30, D-44
Post Mills	Post Mills	4/22	2,900	80	Turf	Good	N/A
		5/23	2,300	80	Turf	Good	N/A
Rutland State	Rutland	1/19	5,000	100	Asphalt	Good	S-40, D-68
		13/31	3,170	75	Asphalt	Good	S-30
Shelburne	Shelburne	1/19	2,500	60	Turf	Good	N/A
Warren-Sugarbush	Warren	4/22	2,575	30	Asphalt	Good	S-8.5
William H. Morse State	Bennington	13	3,704	75	Asphalt	Fair	S-12.5

Source: Airport Facility Directory 2005, FAA 5010 Airport Master Record

AIRPORT NAVIGATIONAL AIDS AND LIGHTING

The existence of navigational aids (NAVAIDs) and lighting at system airports allows them to accommodate varying degrees of aviation activity during periods of reduced visibility and/or during inclement weather conditions. Various types of runway lighting, NAVAIDs, and approaches are available at the 17 airports included in Vermont's Airport System.

Table 2-3 depicts the availability of runway lighting, NAVAIDs, instrument approach capabilities, and visibility minimums at each airport. The data presented Table 2-3 identifies the types of NAVAIDs and lighting available at each system airport and the specific runway ends supported by each. Runway lighting at airports is classified as being low intensity runway lighting (LIRL), medium intensity runway lighting (MIRL), or high intensity runway lighting (HIRL) based on the types of lights used and their configuration.

Specific types of NAVAIDS currently available at system airports include:

- Precision approach path indicators (PAPI)
- Visual approach slope indicators (VASI)
- Runway end identifier lights (REIL)
- Medium intensity approach lighting system with runway alignment indicator lights (MALSR)
- Medium intensity approach lighting system with sequenced flashing lights (MALSF), and
- Omni-directional approach lighting system (ODALS).

PAPIs and VASIs provide visual references to pilots as they conduct approaches to a runway end. REILs identify the end of runway pavement and are an important visual reference to pilots during arrival or departure procedures. MALSR, MALSF, and ODALs are approach lighting systems (ALS) that provide additional visual reference to pilots typically while they are conducting instrument approaches to a runway.

The type of instrument approach available at each airport is also depicted in Table 2-3. Instrument approaches, categorized as precision or non-precision, provide electronic guidance to pilots to support their approach to an airport runway. Non-precision approaches provide electronic guidance to pilots that allow them to locate an airport and runway end. Precision approaches do the same while providing additional electronic glide slope data to a specific runway end.

Table 2-3
Airport Navigational Aids and Lighting

Airport Name	City	Runway	Lighting	NAVAIDS	Instrument Approach Type(s)	Lowest Visibility Minima 1/
Basin Harbor	Vergennes	2	None	None		
		12	None	None		
Burlington International	Burlington	1	MIRL	VASI	RNAV(GPS), VOR	426 – 1
		19	MIRL	PAPI		
		15	HIRL	MALSR	ILS, RNAV(GPS), NDB	250 – ¾
		33	HIRL	MASF, REIL, PAPI	ILS/DME, RNAV(GPS)	200 – ¾
Caledonia County State	Lyndonville	2	LIRL (NSTD)	REIL	NDB, GPS	555 – 1
		20	LIRL (NSTD)			
Edward F. Knapp State	Barre/Montpelier	5	None	None		
		23	None	None		
		17	MIRL	MALSR, PAPI	ILS	300 – $1\frac{1}{4}$
		35	MIRL	REIL	VOR/DME, VOR, GPS	843 – $1\frac{1}{4}$
Fair Haven Municipal	Fair Haven	2	None	None		
		20	None	None		
Franklin County State	Highgate	1	MIRL	REIL, VASI	RNAV(GPS)	632 – 1
		19	MIRL	REIL	RNAV(GPS), VOR/DME	612 – 1
Hartness State	Springfield	5	MIRL	REIL, VASI	RNAV(GPS), LOC/DME, Circling LOC, Circling NDB	965 – $1\frac{1}{2}$
		23	MIRL	None		
		11	MIRL	None		
		29	MIRL	None		
John H. Boylan State	Island Pond	14	None	None		
		32	None	None		
Middlebury State	Middlebury	1	None	None		
		19	None	None		
Morrisville-Stowe State	Morrisville	1	MIRL	REIL	Cirlcing NDB/GPS	1,268 – $1\frac{1}{2}$
		19	MIRL	REIL, VASI	GPS, Circling NDB/GPS	828 – $1\frac{1}{4}$
Mount Snow	West Dover	1	LIRL (NSTD)	None	NDB or GPS	1,567 – 3
		19	LIRL (NSTD)	None		
Newport State	Newport	5	None	None		
		23	None	None		
		18	MIRL	None	Circling NDB	550 – 1
		36	MIRL	REIL, PAPI	GPS, Circling NDB	514 – 1

Table 2-3
Airport Navigational Aids and Lighting, Continued

Airport Name	City	Runway	Lighting	NAVAIDS	Instrument Approach Type(s)	Lowest Visibility Minima 1/
Post Mills	Post Mills	4	None	None		
		22	None	None		
		5	None	None		
		23	None	None		
Rutland State	Rutland	1	MIRL	PVASI	VOR/DME	2,233 - $1^1/_2$
		19	MIRL	ODALS, REIL, VASI	RNAV(GPS), LOC Z, LOC/DME, VOR/DME	813 - 2
		13	MIRL	REIL, PAPI		
		31	MIRL	None		
Shelburne	Shelburne	1	None	None		
		19	None	None		
Warren-Sugarbush	Warren	4	None	REIL		
		22	None	REIL		
William H. Morse State	Bennington	13	MIRL	None	RNAV(GPS), VOR	1,062 - $1^1/_2$
		31	MIRL	REIL, VASI		

Source: Airport Facility Directory 2005, US Terminal Procedure 2005

The presence of a full instrument landing system (ILS), with glide scope and localizer, indicates a precision approach to the runway. The presence of only a localizer (LOC), a non-directional beacon (NDB), very high frequency omni-directional approach (VOR), or global positioning system approach (GPS), indicates a non-precision approach to the runway. The presence of none of these NAVAIDS indicates that an airport can accommodate visual approaches.

Burlington International and Edward F. Knapp State are the only airports in Vermont with precision approaches. Both ends of Runway 15/33 at Burlington International are supported by precision approaches. A precision approach supports Runway 17 at Edward F. Knapp State. Eight system airports, including Burlington International and Edward F. Knapp State, have non-precision approaches, and the remaining seven are supported by a visual approach.

AIRPORT LANDSIDE FACILITIES

Table 2-4 contains information on the availability of pilot and aircraft services such as a general aviation terminal, fuel, maintenance and repair, and air traffic control towers at system airports. In addition to providing the necessary facilities, it is important for system airports to have the types of services necessary to support the needs of their respective users. Currently, 12 system airports have a general aviation terminal, most offering a pilot's lounge, restroom, and telephone. Fuel is available at 13 of Vermont's system airports, seven of which offer both AvGas and jet fuel. Shelburne is the only airport to offer MoGas which is mostly used by smaller recreational or experimental aircraft. Airports or their tenants offer airframe and power plant repair and maintenance at 11 system airports. Burlington International is the only airport in the Vermont airport system with an air traffic control tower.

Table 2-4
Airport Landside Facilities

Airport Name	City	GA Terminal	Fuel	Aircraft Maintenance	Air Traffic Control Tower
Basin Harbor	Vergennes	No	100LL	No	No
Burlington International	Burlington	Yes	100LL, JetA	Airframe and Mechanic	Yes
Caledonia County State	Lyndonville	Yes	100LL	No	No
Edward F. Knapp State	Barre/Montpelier	Yes	100LL, JetA	Airframe and Mechanic	No
Fair Haven Municipal	Fair Haven	No	None	None	No
Franklin County State	Highgate	Yes	100LL	Airframe and Mechanic	No
Hartness State	Springfield	Yes	100LL, JetA	Airframe and Mechanic	No
John H. Boylan State	Island Pond	No	None	No	No
Middlebury State	Middlebury	Yes	100LL	Airframe and Mechanic	No
Morrisville-Stowe State	Morrisville	Yes	100LL, JetA	Airframe and Mechanic	No
Mount Snow	West Dover	No	None	No	No
Newport State	Newport	Yes	100LL, JetA	Airframe and Minor Mechanic	No
Post Mills	Post Mills	No	None	Minor Airframe and Minor Mechanic	No
Rutland State	Rutland	Yes	100LL, JetA	Airframe and Mechanic	No
Shelburne	Shelburne	Yes	MoGas	Airframe and Mechanic	No
Warren-Sugarbush	Warren	Yes	100LL	None	No
William H. Morse State	Bennington	Yes	100LL, JetA	Airframe and Mechanic	No

Source: Airport Facility Directory 2005

AVIATION ACTIVITY STATISTICS

The amount of aviation activity occurring at each Vermont airport impacts the types of facilities needed at each airport and is an important factor in determining the airport's role within the State system. An inventory of based aircraft at each airport is provided in **Table 2-5**. Vermont's 17 airports are the base of operations for 608 aircraft. Table 2-5 indicates that seven of the State's system airports have 50 or more based aircraft, Burlington International having the most with 91 based aircraft. Single-engine aircraft comprise almost 70 percent of the based aircraft in Vermont. Only three of Vermont's system airports have based jet aircraft, Burlington International, Middlebury State, and Rutland State.

Table 2-6 summarizes airport activity statistics as provided by each airport's most recent 5010 Airport Master Record. Table 2-6 shows aircraft operations by type. These recent operations statistics indicate that the State's system of airports accommodates approximately 328,000 aircraft operations on an annual basis. Approximately 12 percent of Vermont's aircraft operations are commercial (air carrier or commuter), while approximately 83 percent are classified as general aviation (air taxi or local/itinerant GA). Nearly five percent of operations are performed by military aircraft.

Table 2-5
Based Aircraft by Airport

Airport Name	City	Based Aircraft: Single Engine	Multi-Engine	Jet	Helicopter	Glider/ Ultralight	Military	Total
Basin Harbor	Vergennes	0	0	0	0	0	0	**0**
Burlington International	Burlington	48	9	5	1	0	28	**91**
Caledonia County State	Lyndonville	19	0	0	0	0	0	**19**
Edward F. Knapp State	Barre/Montpelier	55	5	0	0	0	0	**60**
Fair Haven Municipal	Fair Haven	2	0	0	0	0	0	**2**
Franklin County State	Highgate	46	1	0	1	5	0	**53**
Hartness State	Springfield	28	1	0	0	8	0	**37**
John H. Boylan State	Island Pond	0	0	0	0	1	0	**1**
Middlebury State	Middlebury	42	3	3	0	2	0	**50**
Morrisville-Stowe State	Morrisville	18	2	0	0	8	0	**28**
Mount Snow	West Dover	5	2	0	0	0	0	**7**
Newport State	Newport	15	2	0	0	0	0	**17**
Post Mills	Post Mills	20	0	0	0	9	0	**29**
Rutland State	Rutland	33	3	2	2	1	0	**41**
Shelburne	Shelburne	50	0	0	0	6	0	**56**
Warren-Sugarbush	Warren	20	0	0	0	50	0	**70**
William H. Morse State	Bennington	24	18	0	2	6	0	**50**

Source: FAA 5010 Airport Master Record

Table 2-6
Aircraft Operations

		Aircraft operations						
Airport Name	City	Air Carrier	Commuter	Air Taxi	GA Local	GA Itinerant	Military	Total
Basin Harbor	Vergennes	0	0	0	0	2,000	100	2,100
Burlington International	Burlington	5,761	31,855	0	26,067	27,245	12,171	103,099
Caledonia County State	Lyndonville	0	0	50	1,000	1,000	0	2,050
Edward F. Knapp State	Barre/Montpelier	0	0	1,000	17,000	13,000	1,000	32,000
Fair Haven Municipal	Fair Haven	0	0	0	250	150	0	400
Franklin County State	Highgate	0	0	100	17,000	2,800	1,500	21,400
Hartness State	Springfield	0	0	200	6,500	2,500	100	9,300
John H. Boylan State	Island Pond	0	0	0	50	150	0	200
Middlebury State	Middlebury	0	0	650	27,800	6,000	800	35,250
Morrisville-Stowe State	Morrisville	0	0	200	14,820	2,500	500	18,020
Mount Snow	West Dover	0	0	100	4,000	2,500	0	6,600
Newport State	Newport	0	0	0	5,500	1,460	180	7,140
Post Mills	Post Mills	0	0	10	8,000	1,500	0	9,510
Rutland State	Rutland	0	1,456	4,368	10,192	12,376	832	29,224
Shelburne	Shelburne	0	0	0	2,400	600	0	3,000
Warren-Sugarbush	Warren	0	0	0	19,000	3,500	0	22,500
William H. Morse State	Bennington	0	0	3,000	14,400	9,000	120	26,520

Source: FAA 5010 Airport Master Record

Summary

The data presented in this chapter is used as the foundation for subsequent analyses of airport system performance. As noted in the previous sections, Vermont's aviation system has a wide variety of facilities, services, and activities. The need for facility enhancements, expansions, or system-level improvements is identified through a system analysis conducted in following chapters.

Chapter Three:
Airport Roles

INTRODUCTION

An important initial step in analyzing the future requirements of an airport system is examining the existing system to identify how each airport is currently functioning. In order to identify each airport's current functional role in the system, a detailed analysis based on factors that reflect the contributions made to the overall system was conducted. Factors that reflect contributions made to the overall system include, but are not limited to, factors related to activity, facilities, and accessibility. Based on this analysis, airports in Vermont's existing system of public-use airports are classified, or stratified, in different functional levels.

SYSTEM STRATIFICATION FACTORS

As previously described, the factors chosen in this analysis are reflective of the contributions made by each individual airport to the overall system. The specific factors were also selected because they can be quantified allowing airports to be objectively compared to one another. This analysis focuses on how each airport is currently contributing to the overall system. The system analysis and system recommendations tasks identify recommended future role changes necessary to improve overall performance relative to the system benchmarks previously identified in this study.

The airport stratification factors selected for this analysis are listed below:

- Population within 20 Nautical Miles
- Based Aircraft
- Total Operations
- Approach Type
- Runway Surface
- IFR Operations (Instrument Flight Rule)
- Runway Length
- Economic Impact

The following sections summarize the system stratification process and explain the methodology used to quantify each airport's current contribution to the system. Included in the description of the system stratification process is a summary of each factor examined in the analysis and descriptions of the specific data used.

SYSTEM STRATIFICATION PROCESS

The system stratification process is intended to identify each airport's current role in, or overall contribution to, Vermont's system of airports. Through the stratification process, each system airport was given an actual numeric rating for each of the airport stratification factors previously described. A scale of zero through ten was used to stratify airports with respect to each factor based on raw data collected from the inventory chapter or other data sources. Ten signified the highest rating, representing that the airport(s) had the highest quantified result in the relevant analysis. A score of zero was only assigned only if an airport lacked the specific factor; otherwise a score of one was given to represent that an airport fell in the lowest range of airports for that given factor. For presentation purposes within this study, airports are shown alphabetically.

The methodology used to stratify each airport with respect to the eight factors used in this analysis and the data sources used in the process are briefly described in the following sections. In addition, the outcome of the scoring process is summarized. **Table 3-1** presents the data used for each airport in the system stratification process.

Table 3-1
Stratification Factors and Raw Data

Airport Name	City	Pop. within 20 NM	Based Aircraft	Total Ops	Approach Type	Runway Surface	IFR Operations	Runway Length (ft.)	Economic Impact
Basin Harbor	Vergennes	143,781	0	2,100	Visual	Turf	0	3,000	620,412
Burlington International	Burlington	224,820	91	103,099	Precision	Asphalt-Grooved	1,971	8,320	514,336,023
Caledonia County State	Lyndonville	56,891	19	2,050	Non-Precision	Asphalt	2	3,300	6,108,471
Edward F. Knapp State	Barre/Montpelier	91,855	60	32,000	Precision	Asphalt	102	5,002	12,132,885
Fair Haven Municipal	Fair Haven	98,408	2	400	Visual	Gravel	0	1,950	246,551
Franklin County State	Highgate	75,856	53	21,400	Non-Precision	Asphalt	1	3,000	1,608,812
Hartness State	Springfield	98,958	37	9,300	Non-Precision	Asphalt	56	5,498	1,291,724
John H. Boylan State	Island Pond	40,567	1	200	Visual	Turf	0	2,650	53,958
Middlebury State	Middlebury	75,081	50	35,250	Visual	Asphalt	0	2,500	20,937,611
Morrisville-Stowe State	Morrisville	92,572	29	18,020	Non-Precision	Asphalt	38	3,701	12,231,886
Mount Snow	West Dover	112,294	7	6,600	Non-Precision	Asphalt	0	2,650	1,650,878
Newport State	Newport	35,788	17	7,140	Non-Precision	Asphalt	34	4,000	357,262
Post Mills	Post Mills	99,543	29	9,510	Visual	Turf	0	2,900	3,245,887
Rutland State	Rutland	90,745	41	29,224	Non-Precision	Asphalt	484	5,000	21,699,807
Shelburne	Shelburne	188,622	56	3,000	Visual	Turf	0	2,500	N/A
Warren-Sugarbush	Warren	112,267	70	22,500	Visual	Asphalt	0	2,575	658,145
William H. Morse State	Bennington	150,930	50	26,520	Non-Precision	Asphalt	13	3,704	11,377,300

Source: FAA 5010 Airport Master Record, Wilbur Smith Associates, GCR & Associates-Airport IQ Data Center

Population within 20 Nautical Miles

Estimates of total population within a 20-nautical mile radius of Vermont's airports were gathered to identify the approximate number of Vermont's citizens provided access to aviation facilities and service by each airport. Population data was analyzed using ArcGIS 9, a Geographic Information System (GIS) program. Census block information provided from the 2000 U.S. Census was used to compile and sum the estimated population that was located within a 20-nautical mile radius of each airport. While there are more recent estimates of population, the 2000 Census provided the most detail with regard to counts at the block level which could then be allocated to each system airport. For the three airports located within 20-nautical miles of Canada, estimated populations were provided by ArcGIS 9, which contains population data from 1996 on a municipal-level for Canada.

Estimates of total population within the identified 20-nautical mile radius of a system airport ranged from over 224,820 at Burlington International to 47,214 at John H. Boylan State. Based on the results, airports were stratified into 5 groupings based upon natural breaks in the population data and given ratings from two, for airports capturing the lowest amount of the State's population, to ten being the greatest.

Based Aircraft

Airports are stratified based on the total number of permanently based aircraft. Data presented in Chapter 2, *Inventory*, represents the most current count of based aircraft at each system airport. Total based aircraft counts at Vermont airports ranged from zero at Basin Harbor to a high of 91 at Burlington International Airport. Airports were placed into groups based upon five natural breaks in the based aircraft data, and given a score between two and ten. It should be noted that Basin Harbor received no points in the based aircraft stratification process because data indicates that there are no aircraft permanently based at that airport.

Total Operations

Airports are stratified based on the number of total annual aircraft operations occurring at the airport. Annual data for 2004 was used in this analysis. Actual activity counts are only available for Burlington International Airport because it is the only airport in the State with an air traffic control tower. Total operations at each of the other airports represent estimates and were taken from FAA 5010 Form, Airport Master Record.

Data indicates that Burlington International accommodated the most aircraft operations in 2004, with a total of approximately 104,000 operations. The lowest estimates of total annual operations correspond to a turf runway airport, John H. Boylan State. It is estimated that approximately 200 total annual operations occurred at this facility. System airports were placed into one of five groups based upon natural breaks in the total operations, and rated on a scale of two through ten.

APPROACH TYPE

Available approach types at each airport are another factor used in the system stratification process. Airports are evaluated based on the most advanced, or most demanding, published approach available. The following approach categories are used:

- Precision Approach
- Non-Precision Approach
- Visual Approach

A precision approach provides the highest degree of accessibility and is typically preferred by aircraft operators using larger, more advanced aircraft, such as corporate jets. Airports having a published precision approach were given a rating of ten in the stratification process. Airports with non-precision approaches were given five points. Airports that only have a visual approach, which restricts their ability to accommodate aircraft operations during periods of reduced visibility, were given one point.

RUNWAY SURFACE

Airports are stratified based on the surface type of the primary runway. Primary runway surfaces at Vermont airports include:

- Grooved-Asphalt
- Asphalt
- Gravel
- Turf

Inventory data from Chapter 2 provides information on the various runway surface types at each Vermont airport. There are four types of surfaces identified, and scores were distributed based upon the type of surface. Burlington International, which has a grooved-asphalt runway, received the highest rating with a score of ten. Ratings of nine were given to asphalt runways and five for turf and gravel surfaces.

IFR Operations

Airports are stratified based on available data that provides an estimate of the number of annual general aviation aircraft operations that were conducted at each airport in 2004 by aircraft that had filed instrument flight plans. This factor was selected because it gives an indication of the overall amount of business/corporate aviation activity occurring at each airport and each airport's corresponding contribution to economic development in its area. For this analysis, data for such activity at Vermont's airports was gathered from GCR Associates Inc., which collects and maintains databases of private general aviation operations at airports nationwide.

Counts of total aircraft operations conducted with instrument flight plans were compiled for the year 2004, and stratified by six natural breaks in the totals. Nine of the smaller airports did not have any recorded IFR operations, and as a result received a score of zero. A rating between five and ten was given to the airports that had at least one recorded IFR operation in 2004. GCR data indicates that Burlington International Airport had the most recorded general aviation IFR operations with a total of 1,971 in 2004. It should be noted that general aviation operations conducted in visual meteorological conditions without an instrument flight plan are not included in this data.

Runway Length

Airports are stratified based on the length of their primary runway. Runway lengths as presented in Chapter 2, *Inventory*, are used in this analysis. For those airports having more than one runway, the length of the longest runway is used in the stratification process. Primary runway lengths at Vermont airports range from 8,320 feet at Burlington International Airport to 2,500 feet and under at several airports. A rating of two through ten was given to each airport based on significant runway lengths that are due to the type of aircraft that can operate at certain lengths.

Economic Impact

To provide a measure of each airport's contribution to regional and State economies, system airports are stratified based on their relative level of economic impact, as identified in the 2003 Statewide Airport Economic Impact Study. The economic impact study was prepared for the Vermont Agency of Transportation and provides economic impact data for 16 of the current 17 system plan airports.

Estimated total economic impacts at Vermont airports ranged from more than $514 million at Burlington International Airport to under $54,000 dollars at turf runway airports such as John H. Boylan State. The estimated economic impacts were stratified into scores of one through ten based on natural breaks in the data. Shelburne was not included in the study prepared in 2003. As a result, Shelburne was scored the same as other airports with similar facilities and activity.

SYSTEM STRATIFICATION DATA AND RESULTS

Once system airports were ranked by the eight system contribution factors, each of the factors was then reviewed based upon an overall importance to the system. Three factors were considered to have a significantly greater impact and importance to the overall system and the State. These include:

- IFR Operations
- Runway Length
- Economic Impact

In discussions between the VTrans Working Group and through the knowledge and national experience of the consultant, it was determined that these three factors be weighted in the role stratification process, in order to represent their increased importance to the overall system. It was determined that these factors be multiplied by a factor of three. Each airport's final weighted score for all system stratification factors was then summed. **Table 3-2** presents the study airports and the results of the stratification process for each of the factors examined in this analysis.

Table 3-2
Stratification Factors and Ratings

		Non-Weighted Scores				Weighted Scores				
Airport Name	City	Pop. within 20 NM	Based Aircraft	Total Ops	Approach Type	Runway Surface	IFR Ops	Runway Length (ft.)	Economic Impact	Total Weighted Score
John H. Boylan State	Island Pond	2	2	2	1	5	0	4	1	27
Fair Haven Municipal	Fair Haven	6	2	2	1	5	0	2	2	28
Basin Harbor	Vergennes	8	0	2	1	5	0	4	4	40
Shelburne	Shelburne	10	8	2	1	5	0	4	1	41
Post Mills	Post Mills	6	6	4	1	5	0	4	6	52
Mount Snow	West Dover	6	2	4	5	9	0	4	5	53
Warren-Sugarbush	Warren	6	8	6	1	9	0	4	4	54
Caledonia County State	Lyndonville	2	4	2	5	9	5	4	7	70
Newport State	Newport	2	4	4	5	9	6	7	3	72
Middlebury State	Middlebury	4	8	8	1	9	0	4	9	69
Franklin County State	Highgate	6	8	6	5	9	5	4	5	76
Morrisville-Stowe State	Morrisville	6	6	6	5	9	6	5	8	89
Hartness State	Springfield	6	6	4	5	9	7	9	5	93
William H. Morse State	Bennington	8	8	8	5	9	5	5	8	92
Rutland State	Rutland	6	6	8	5	9	9	9	9	115
Edward F. Knapp State	Barre/Montpelier	6	8	8	10	9	8	9	8	116
Burlington International	Burlington	10	10	10	10	10	10	10	10	140

Source: Wilbur Smith Associates

AIRPORT FUNCTIONAL LEVELS

The objective of this exercise is to group the airports into functional levels based on their current contribution to the State's airport system and the airport's current role in meeting statewide aviation needs. The functional levels that are developed for use in the Vermont Airport System Plan are developed based on the results of the stratification process and are intended to segregate the system's existing airports based on their current contribution to the statewide airport system as a whole. The four different functional levels that have been identified in this analysis represent groupings that occurred as a result of an analysis that examined a number of factors, including proximity to population, types of existing facilities, and current activity levels.

Through the system stratification process, airports are stratified based on the eight factors previously described. At the conclusion of the rating process, airports are given a score that included three weighted factors in the total score. When these overall scores are sorted from high to low, natural breaks occurred in the sorting. These natural breaks are the points at which the airports are segregated into functional levels.

Based on the scoring process previously described, system airports are divided into four functional levels. The four functional levels were chosen based on several discussions between the VTrans Working Group and the consultant, and have been used in other state system plans, and are commonly used throughout the country. The functional roles are:

- National Service
- Regional Service
- Local Service
- Specialty Service

Table 3-3 illustrates the results of this process and identifies the associated functional role of each system airport. **Exhibit 3-1** graphically depicts the results of this roles analysis and the location of airports in each airport role category.

Table 3-3
Vermont Airport System Functional Roles

Functional Role	Airport Name	City	Score
National Service	Burlington International	Burlington	140
	Edward F. Knapp State	Barre/Montpelier	116
	Rutland State	Rutland	115
Regional Service	Hartness State	Springfield	93
	William H. Morse State	Bennington	92
	Morrisville-Stowe State	Morrisville	89
Local Service	Franklin County State	Highgate	76
	Newport State	Newport	72
	Caledonia County State	Lyndonville	70
	Middlebury State	Middlebury	69
Specialty Service	Warren-Sugarbush	Warren	54
	Mount Snow	West Dover	53
	Post Mills	Post Mills	52
	Shelburne	Shelburne	41
	Basin Harbor	Vergennes	40
	Fair Haven	Fair Haven	28
	John H Boylan State	Island Pond	27

Source: Wilbur Smith Associates

Vermont Airport System Plan

Public-Use Airport Functional Roles

Exhibit 3-1

The following sections briefly describe each of the functional role categories that have been designated for use in the system plan. These descriptions provide a general explanation of the primary types of users and activity intended to be accommodated by airports in the different airport role categories. The descriptions are not intended in any way to restrict the types of activity occurring at system airports.

- **National Service Airports** – National Service airports accommodate the highest level of general aviation activity. These airports serve a contributing role in enabling the local, regional, and statewide economy to have access to and from the national and global economy. Two of the airports in this category, Burlington International and Rutland State, also provide access to scheduled commercial airline service.

- **Regional Service Airports** – Regional airports serve primarily general aviation activity, with a focus on serving business activity including small jet and multiengine aircraft. These airports serve a significant role in supporting the local and regional economies and connecting them to the State and national economies.

- **Local Service Airports** – Local Service airports are considered to have community importance, primarily serving recreational and personal flying activities. The airports serve a contributing role in the local economy. These airports may serve some corporate/business aviation users, including jet activity; in addition to flight training, but primarily provide storage and facilities for piston-driven single and multi-engine aircraft.

- **Specialty Service Airports** – Specialty airports provide aviation services for smaller single-engine aircraft and other non fixed-wing aircraft such as ultralights and gliders, and balloons. In some cases, these airports provide access to seasonal tourist destinations in Vermont.

As described, for the various airport role categories, aviation users vary from commercial passengers and air cargo companies to recreational pilots with ultra-lights. Each functional role can serve a wide variety of these various users. These explanations are not intended to place limits or constraints on what types of aviation activity can occur at airports in each functional role, only to familiarize the reader with the primary uses that are intended to be supported by each role category.

Chapter Four: Forecasts of Aviation Activity

INTRODUCTION

Effective planning for the future of Vermont's aviation system requires an understanding of anticipated future levels of aviation activity. This chapter focuses on forecasting aviation activity for the State, both commercial and general aviation. Projections have been developed for a 20-year period, using 2005 as a base year, through 2025. These forecasts are subsequently utilized in the facility analyses.

The assumptions and methodologies used to prepare aviation demand projections for the airports included in the Vermont Airport System Plan are discussed in the following sections:

- Socioeconomic Conditions
- Industry Trends
- Forecast Approach and Considerations
- General Aviation Projections
- Commercial Service Activity Projections
- Military Activity Projections
- Summary

SOCIOECONOMIC CONDITIONS

A complete analysis of Vermont's aviation system must include an inventory of the basic social and economic characteristics of the State. With an understanding of the composition of Vermont's population and employment, effective long-term planning for aviation facilities may begin.

POPULATION

Vermont is a relatively small state both geographically and according to population. Vermont is comprised of 14 counties, covering less than 10,000 square miles, making it the 45th largest state by land mass. It is the only New England state that doesn't have a coastline along the Atlantic Ocean.

The population of Vermont in 2004 was estimated by the U.S. Census Bureau to be approximately 621,394 people. This was an increase of approximately 11,500 persons since the 2000 Census, and a 10-year increase of 32,392 as depicted in **Table 4-1**. Vermont's population, while growing, has not grown as fast as the United States' population over the same period. Between 1995 and 2004, Vermont's population increased at a compound annual growth rate (CAGR) of 0.54 percent, about half of the growth rate seen in the U.S. over the same 10 years. The portion of the U.S. population living in Vermont has remained steady, decreasing slightly from 0.22 to 0.21 percent over the same period of time.

Table 4-1
Historic Vermont and U.S. Population

Year	Vermont Population	U.S. Population	VT % of U.S.
1995	589,002	265,471,847	0.22%
1996	593,701	268,582,017	0.22%
1997	597,239	271,818,977	0.22%
1998	600,416	275,040,082	0.22%
1999	604,683	278,195,745	0.22%
2000	608,827	282,192,162	0.22%
2001	612,964	285,102,075	0.21%
2002	616,500	287,941,220	0.21%
2003	619,343	290,788,976	0.21%
2004	621,394	293,655,404	0.21%
CAGR 95-04	**0.54%**	**1.01%**	

Source: U.S. Census Bureau

According to the U.S. Census Bureau's 2004 estimates, nearly one-quarter of the people of Vermont live in Chittenden County. Burlington, located in Chittenden County, is the largest city in Vermont with an estimated 38,934 people. **Table 4-2** presents populations projections for the 14 counties in Vermont through 2020 using the 2000 U.S. Census data as a base year, as provided by the Massachusetts Institute for Social and Economic Research (MISER). Vermont is projected to grow between 2005 and 2020 at an average annual rate of 0.41 percent, slightly less than its historic average annual rate of growth of 0.54 percent of the past 10 years. This is still significantly less than that of the U.S., which is anticipated to grow at a compound annual rate of 0.86 percent over the same course of time.

Table 4-2
Population Projections by County

County	2000*	2005	2010	2015	2020	CAGR '05-'20
Addison	35,974	37,052	37,907	38,805	39,813	0.48%
Bennington	36,994	37,295	37,420	37,530	37,694	0.07%
Caledonia	29,702	30,455	31,121	31,816	32,550	0.44%
Chittenden	146,571	152,846	157,471	161,491	165,813	0.54%
Essex	6,459	6,603	6,711	6,848	6,981	0.37%
Franklin	45,417	47,617	49,583	51,701	54,065	0.85%
Grand Isle	6,901	7,423	7,923	8,433	8,958	1.26%
Lamoille	23,233	24,442	25,601	26,756	27,898	0.89%
Orange	28,226	28,976	29,544	30,122	30,737	0.39%
Orleans	26,277	26,899	27,453	28,009	28,562	0.40%
Rutland	63,400	63,936	64,255	64,637	65,030	0.11%
Washington	58,039	59,141	59,931	60,636	61,322	0.24%
Windham	44,216	45,093	45,769	46,455	47,171	0.30%
Windsor	57,418	58,154	58,553	58,960	59,446	0.15%
Vermont	**608,827**	**625,935**	**639,241**	**652,199**	**666,041**	**0.41%**

Source: Massachusetts Institute for Social and Economic Research
* 2000 U.S. Census

EMPLOYMENT

A primary function of this Airport System Plan is to measure the current usage and predict the future reliance of Vermont's citizens on its system of aviation facilities. One measure of the relative prosperity of Vermont's citizens is to examine the employment and unemployment patterns in the State. **Table 4-3** shows the labor force and employment characteristics for Vermont over the last 10 years. Vermont has experienced slow employment growth over the past 10 years, but unemployment rates for the State have been dropping since 2002. Total persons employed have increased at a higher rate than the labor force in Vermont since 1995, driving the unemployment rate down over this period. As of June 2005, the unemployment rate in Vermont was 3.3 percent, lower than the national average of 5.0 percent.

Table 4-3
Historic Labor Force, Employment and Unemployment Rate

Year	Labor Force	Employment	Unemployment	Unemployment Rate (%)
1995	320,600	306,800	13,700	4.3
1996	326,400	312,200	14,200	4.4
1997	331,700	319,500	12,200	3.7
1998	333,100	323,300	9,700	2.9
1999	335,000	326,300	8,800	2.6
2000	337,800	328,600	9,200	2.7
2001	343,300	330,500	12,800	3.7
2002	350,200	334,600	15,600	4.4
2003	353,500	338,400	15,100	4.3
2004	354,700	342,000	12,700	3.6
2005*	356,150	344,250	11,900	3.3
CAGR 95'-	**0.9%**	**1.0%**	**-1.2%**	**-2.0%**

Source: Vermont Department of Labor
*June 2005

Employment projections for each of the 14 counties in Vermont are presented in **Table 4-4**. The Vermont Department of Labor (VDOL) does not provide employment projections on a county level. As a result, the compound annual growth rate from Woods and Poole's employment projections for each county for 2005 through 2025 was applied to the current employment as reported for June 2005 by the VDOL, and extrapolated throughout the planning period. Woods and Poole, Inc. is a highly respected and trusted source of socioeconomic data and projections used by many public and private agencies. The compound annual growth rate for all of Vermont provided from Woods and Poole for the planning period was 1.03 percent, which is comparable to the 1.1 percent compound annual growth rate as determined by the VDOL for the years 2002-2012. The U.S. total employment is projected to grow slightly faster with an annual rate of growth of 1.4 percent, for the years 2002-2012. Table 4-4 shows each county's projected employment through 2025. On a statewide level, employment is projected to increase at an average annual rate of 1.0 percent, continuing the same pattern of growth as the last 10 years.

Table 4-4
Employment Projections by County

County	2005*	2010	2015	2025	CAGR 05'-25'
Addison	20,550	22,217	24,019	28,075	1.6%
Bennington	19,900	20,875	21,899	24,098	1.0%
Caledonia	16,800	17,827	18,918	21,303	1.2%
Chittenden	86,300	91,325	96,642	108,223	1.1%
Essex	3,350	3,403	3,458	3,569	0.3%
Franklin	25,100	26,459	27,891	30,992	1.1%
Grand Isle	4,000	4,313	4,650	5,406	1.5%
Lamoille	14,900	15,876	16,916	19,204	1.3%
Orange	16,000	16,863	17,772	19,740	1.1%
Orleans	14,600	15,359	16,158	17,883	1.0%
Rutland	34,550	35,431	36,334	38,211	0.5%
Washington	30,900	32,089	33,324	35,938	0.8%
Windham	25,150	26,344	27,595	30,278	0.9%
Windsor	32,100	33,790	35,569	39,413	1.0%
Vermont	**344,250**	**362,299**	**381,293**	**422,323**	**1.0%**

Source: *2005 Vermont Department of Labor
CAGR 05'-25' provided by Woods and Poole 2005

INDUSTRY TRENDS

In order to predict how Vermont's aviation activity may grow over the planning period, it is important to have an understanding of trends in the aviation industry that may impact growth, either positively or negatively. Trends for the general aviation and commercial industries are discussed below.

GENERAL AVIATION

General aviation refers to a broad category of aviation activity and includes all operators with the exception of airlines and the military. General aviation activity occurs at each airport in Vermont's system, including Burlington International, the largest commercial service airport in the State. The health of the national general aviation industry, and trends related to general aviation pilots, aircraft, and users, are important factors that can impact activity levels and facility development needs at general aviation airports across the country, including Vermont.

A pronounced decline in the general aviation industry began in 1978 and lasted throughout the 1980s and into the mid-1990s. This decline resulted in the loss of over 100,000 manufacturing jobs and a drop in aircraft production from approximately 18,000 annually to only approximately 930 in 1994. A dramatic drop in the number of new student pilots was also experienced over this period. Factors contributing to the decline in general aviation included liability claims against aircraft manufacturers, the loss of Veterans Benefits that covered many costs associated with student pilot training, and a recessionary economy.

Enactment of the General Aviation Revitalization Act (GARA) of 1994 provided significant relief to the general aviation industry primarily as a result of an 18-year statute of repose that it placed on the manufacture of all general aviation aircraft and their components. Previously, there had been no time limit to filing liability claims. Positive impacts of the GARA are reflected in national statistics that indicated an increase in general aviation activity, an increase in the active general aviation aircraft fleet, and an increase in shipments of fixed-wing general aviation aircraft. In addition, since 1994, annual general aviation shipments and total billings have each more than doubled.

More recently, the terrorist attacks of September 11, 2001, and the ensuing recessionary national economy had a dampening impact on positive general aviation industry trends. Significant restrictions were placed on general aviation activity following the attacks and these restrictions resulted in severe limitations being placed on general aviation operators in many areas of the country. Many of those restrictions have now been lifted and most segments of general aviation activity, including business and corporate aviation, have rebounded and continue to experience positive trends.

On an annual basis, the FAA publishes forecasts that summarize anticipated trends in most components of civil aviation activity, including general aviation. Each published forecast revisits previous activity forecasts and updates them after examining the previous year's trends in aviation and economic activity. Many factors are considered in the FAA's development of forecasts, some of the most important of which are U.S. and international economic growth and anticipated trends in fuel costs. These forecasts were published in March 2005 and included an assumed spike in oil costs during the first quarter of 2005 after which oil prices were assumed to decline in 2006 and experience moderate increases through the projection period. Should the relatively high cost of oil experienced at the time of writing of this report, November 2005, continue, the projected activity growth identified in the FAA forecasts may be impacted.

FAA forecasts generally provide one of the most detailed analyses of historic and forecasted aviation trends and provide the general framework for examining future levels of aviation activity for the nation as well as in specific states and regions.

Those general aviation trends identified in FAA's most recent forecasts, *FAA Aerospace Forecasts, Fiscal Years 2005-2016*, that are most likely to impact general aviation in Vermont include the following:

- Continued growth in corporate aviation including fractional ownership, a market that has experienced strong growth but is only minimally developed, and on-demand air taxi services.

- Continued entry of new commercial manufacturers, such as Cirrus and Eclipse, into the general aviation aircraft market.

- Continued growth in the number of amateur-built experimental aircraft in the general aviation fleet, a component of the general aviation fleet whose numbers have increased from 2,100 in 1970 to over 30,000 in 2004.

- An increase in the number of pilots and interest in flying as a result of the Sport Pilot and Light Sport Aircraft Rule. Sport pilot regulations cover the training and certification requirements of sport pilots, sport flight instructors, light sport aircraft, and light sport aircraft repairmen. Sport pilots require less training and have fewer privileges than private pilots, including limiting flight privileges to day visual flight rule (VFR) conditions. Sport aircraft must meet specific design restrictions, including limits of two seats, a maximum gross take-off weight of 1,320 pounds and a maximum level flight speed of 120 knots. The number of pilots with a sport pilot certificate is forecasted to increase at an average annual growth rate of 4.3 percent from 2005 through 2016.

- Growth in jet aircraft activity associated with the introduction of micro jets, representing a new aircraft market, to the active general aviation fleet. Micro jets, also known as very light jets, merge new jet engine technologies and sophisticated avionics equipment to create advanced jet aircraft, capable of carrying between four and six passengers, at an acquisition cost significantly lower than previous jet aircraft.

Forecasts of national general aviation activity developed by FAA can be summarized as follows:

- Growth in the active general aviation aircraft fleet at an average annual rate of approximately 0.8 percent from 2005 to 2016, including these anticipated average annual growth rates in the following aircraft categories:

    - Single-engine piston – 0.2 percent
    - Multi-engine piston – decline of 0.2 percent
    - Turboprop – 1.2 percent
    - Turbojet – 5.6 percent
    - Rotorcraft – 1.1 percent

- Total general aviation hours flown are projected to increase at an average annual rate of 1.5 percent between 2005 and 2016. The strongest growth, approximately 6.9 percent annually, is anticipated in the turbojet category as a result of the introduction of micro jets and the continued strong growth in fractional ownership aircraft which have high utilization rates.

- The total population of pilots is projected to increase at an average annual rate of approximately 1.5 percent between 2005 and 2016. The strongest growth is anticipated in the student pilot category.

These trends, forecasts, and their anticipated impact on Vermont's general aviation airports and users are considered in conjunction with State-specific general aviation and demographic trends to develop the State airport system forecast of aviation demand.

Commercial Airline Industry Trends

The U.S. airline industry is currently in a state of crisis. Deregulation of U.S. airlines in 1978 changed the once-stable industry into an ultra-competitive, cost-driven business with little room for underperformers. Currently, several air carriers are either operating under Chapter 11 bankruptcy or in danger of doing so. In 2005, record-high oil prices put further strain on already-struggling carriers. Carriers are now forced to make crucial alterations to their business plans in order to survive. In short, the airline industry is currently undergoing tumultuous change.

Beginning in 2000, the "dot-com" bust was well underway and a general economic downturn had begun. When coupled with the terrorist attacks of September 11, 2001, a new era of airline industry woes in the U.S. was ushered in. The industry witnessed a significant decline in demand for air travel. Both business and leisure travelers began seeking cheaper airfares. Increased fuel costs, fewer travelers, and the high airline labor costs began the worst airline industry downturn in U.S. history. These events substantially impacted traditional carriers such as United, Delta, TWA, and American. At the same time, the new entrants and long-term low-cost giant, Southwest, stayed their course, continuing to make money despite the economy.

In 2001, the events of September 11th led to loss of over $8 billion in the U.S. airline industry, even after accounting for $5 billion in government stabilization payments. In 2002, passenger demand for air travel did not return, even though carriers cut fares while trying to reduce costs. The total loss for all U.S. airlines in 2002 topped $11 billion. The Air Transport Association reported that U.S. carriers lost approximately $32.3 billion between 2001 and 2004, and that 2004 was the fourth consecutive year of continued losses for its airlines.

In order to reduce losses and stabilize itself, the U.S. airline industry continues to undertake dramatic cost cutting strategies. Many of the high-cost traditional hub-and-spoke carriers have noted that they have to change the way they do business in order to stay in business. Many of the major U.S. airlines use the traditional hub-and-spoke model, which is designed to extract relatively high airfares from passengers while offering seamless travel around the world.

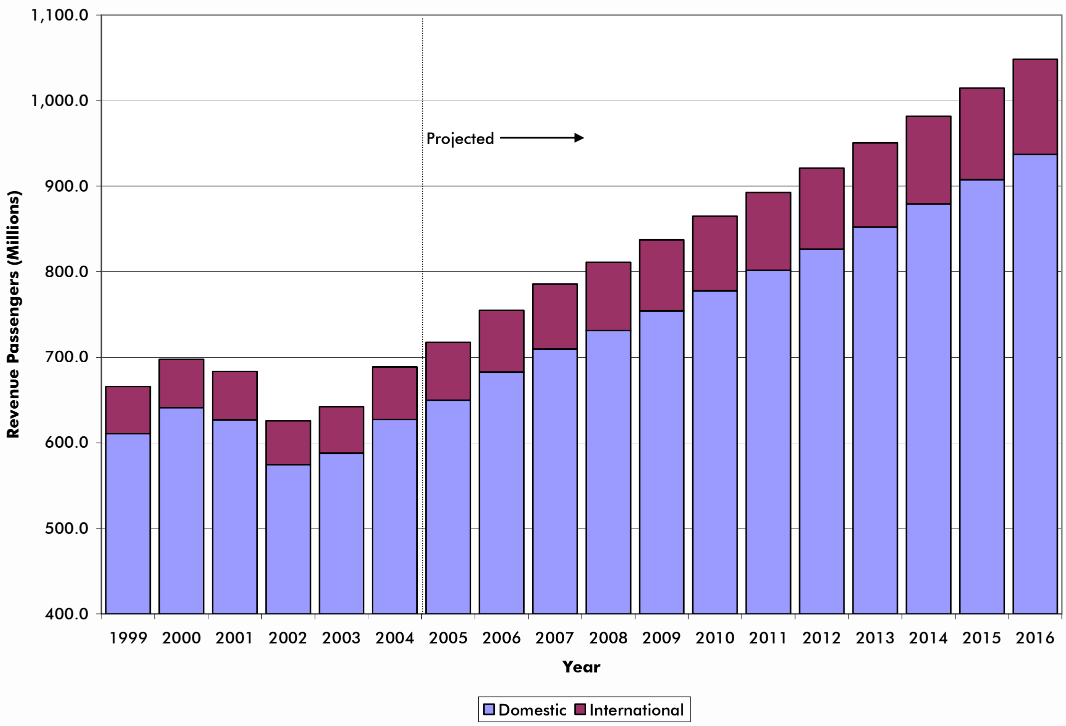
The excessive expenses of the hub-and-spoke model took their toll on the largest airlines during the recent downturn. Major airlines in the U.S. had no choice but to reduce costs, cut capacity, and restructure their business models. Nationwide, aircraft were parked, retired, or returned to lessors and manufacturers. Along with heavy financial losses and massive layoffs experienced by nearly all carriers, US Airways filed for bankruptcy in mid-2002 and United followed in December 2002 after failing to negotiate necessary wage and salary decreases with its employees. Many other carriers, including America West, depended on the government loan guarantees after September 11th to keep them out of bankruptcy. Several carriers, including Vanguard, Midway, and National Airlines, could not sustain the losses incurred and went out of business. Trans World Airlines (TWA) was bought by American, which eventually reduced TWA's traditional hubbing operation at St. Louis.

In 2003 the war in Iraq further strained both traffic and U.S. air carriers' bottom lines. US Airways emerged from bankruptcy in early 2003, but was forced to reenter bankruptcy in September 2004. During its reorganization, US Airways reduced its hubbing operation in Pittsburgh and demoted it to a "focus city." America West also felt the pressure as it introduced a new price structure and abandoned its small hub in Columbus, Ohio. In 2005, these two airlines merged to form one airline, now named US Airways.

The re-emergence of leaner, strengthened carriers with lower costs will put pressure on the other large carriers to cut their labor and operating costs. As the largest airlines gain more control of their expenses, they are becoming more competitive with Southwest Airlines and other discount airlines such as JetBlue.

While U.S. air carriers have struggled, growth in annual passengers in the commercial aviation system has returned to a pattern of annual growth, largely because of lower fares. According to the FAA's *Aerospace Forecasts Fiscal Years 2005-2016*, domestic passenger totals in 2004 rebounded to pre-9/11 levels, and growth is forecast to exceed 3.5 percent on a compound annual basis. A considerable source of this growth is in international passengers, which are expected to grow in excess of five percent (compounded) through 2016. **Exhibit 4-1** illustrates this potential growth.

Exhibit 4-1
Annual Revenue Passenger Enplanements
1999-2016



Source: FAA Aerospace Forecasts Fiscal Years 2005-2016

In fiscal year 2004, the U.S. commercial aviation industry, consisting of mainline air carriers and regional/commuter airlines, flew a combined 953.6 billion available seat-miles (ASMs, the number of available seats multiplied by the number of miles each seat was flown). These carriers enplaned 688.5 million passengers who flew 717.4 billion revenue passenger-miles, (RPMs, the number of total miles flown by all paying passengers), achieving an all-time high load factor of 75.2 percent. In 2004, the carriers' trip length averaged 1,042.1 miles while their aircraft averaged 135.4 seats.

By 2016, the FAA forecasts that U.S. commercial air carriers will fly a total of almost 1.6 trillion ASMs, an annual growth rate of 4.2 percent. These carriers are projected to transport over 1.0 billion enplaned passengers that year (up 3.6 percent annually). Load factors are projected to average 76.3 percent in 2016. The average passenger trip length is expected to increase to 1,139.4 miles (up 8.1 miles annually) while aircraft size increases to 139.6 seats (up 0.4 seats a year).

FORECAST APPROACH AND CONSIDERATIONS

Demand projections fall into two distinct categories, general aviation and commercial service. Significant differences in these two sectors of the aviation industry often make it necessary to modify the general approach or methodology used in forecasting to reflect the availability of data or airport or industry conditions. The general approach often used to develop aviation forecasts is to identify historic relationships between state-specific aviation elements and U.S. aviation activity. Actual trends in demand experienced on an airport, state, regional, and national basis are also considered.

GENERAL AVIATION CONSIDERATIONS

For the Vermont Airport System Plan, reliable historical general aviation data for each airport in the system is not readily available for all activity indicators. As a result, each airport's most recent FAA 5010 Airport Master Record serves as the basis of data for based aircraft and the number of operations at each airport, which were summarized in Chapter Two. It should be noted that military based aircraft and operations will not be counted or used in the forecasts for general aviation based aircraft and operations. Burlington International Airport is the only study airport that has based military aircraft, with a total of 28. Several of the study airports had military operations occur in 2005.

There were a total of 583 general aviation based aircraft reported in Vermont in 2005, as depicted in **Table 4-5**. Of the total number of based aircraft, 72 percent are based at publicly owned airports, with the remaining 28 percent located at privately owned airports.

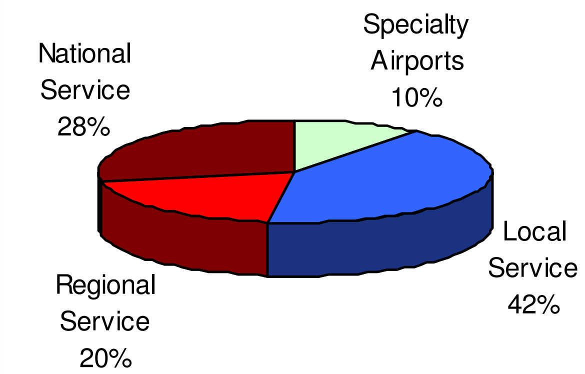
Table 4-5
2005 Based Aircraft in Vermont

Airport Name	City	2005 Based Aircraft
Basin Harbor	Vergennes	0
Burlington International	Burlington	63
Caledonia County State	Lyndonville	19
Edward F. Knapp State	Barre/Montpelier	60
Fair Haven Municipal	Fair Haven	2
Franklin County State	Highgate	53
Hartness State	Springfield	37
John H. Boylan State	Island Pond	1
Middlebury State	Middlebury	50
Morrisville-Stowe State	Morrisville	28
Mount Snow	West Dover	7
Newport State	Newport	17
Post Mills	Post Mills	29
Rutland State	Rutland	41
Shelburne	Shelburne	56
Warren-Sugarbush	Warren	70
William H. Morse	Bennington	50
All Vermont Airports		**583**

Source: FAA 5010 Airport Master Record

In Chapter Three, each public-use airport in Vermont was stratified into one of four different roles based upon its activity and facilities, and how each contributes to the State system. **Exhibit 4-2** presents the percentages of based aircraft for each of the roles for 2005. Local Service airports have the most based aircraft in Vermont, with 42 percent of the statewide aircraft. National Service airports have the second greatest share of statewide based aircraft, with 28 percent. The three airports classified as Regional Service contain 20 percent, with the remaining 10 percent located at the Specialty Airports.

Exhibit 4-2
2005 Vermont Based Aircraft by Role



Source: Airport Management; Wilbur Smith Associates

General aviation operations data for Vermont airports are presented in **Table 4-6**. Approximately 84 percent of all statewide general aviation operations occurred at Vermont's publicly owned airports in 2005. The remaining 16 percent of general aviation operations occurred at privately owned airports throughout the State.

Table 4-6
2005 General Aviation Operations

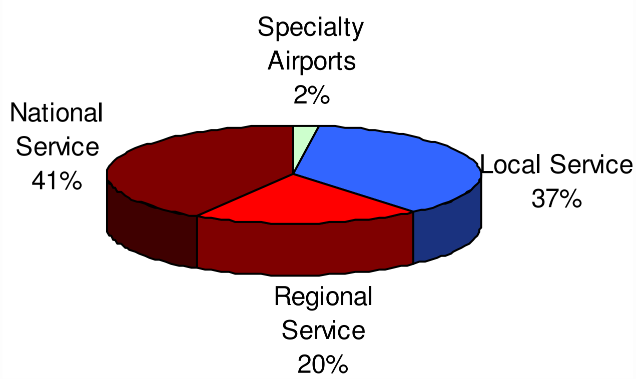
Airport Name	City	2005 Aircraft Operations
Basin Harbor	Vergennes	2,000
Burlington International	Burlington	53,312
Caledonia County State	Lyndonville	2,050
Edward F. Knapp State	Barre/Montpelier	31,000
Fair Haven Municipal	Fair Haven	400
Franklin County State	Highgate	19,900
Hartness State	Springfield	9,200
John H. Boylan State	Island Pond	200
Middlebury State	Middlebury	31,450
Morrisville-Stowe State	Morrisville	17,520
Mount Snow	West Dover	6,600
Newport State	Newport	6,960
Post Mills	Post Mills	9,510
Rutland State	Rutland	26,936
Shelburne	Shelburne	3,000
Warren-Sugarbush	Warren	22,500
William H. Morse	Bennington	26,400
All Vermont Airports		**268,938**

Source: FAA 5010 Airport Master Record

As shown in **Exhibit 4-3**, in 2005, 41 percent of statewide general aviation operations occurred at National Service airports. Local Service airports in Vermont facilitate the next highest amount of general aviation operations with 37 percent.

Regional Service Airports handled approximately 20 percent of all general aviation operations, with the remaining two percent occurring at the Specialty Airports.

Exhibit 4-3
2005 General Aviation Operations by Role



Source:

5010 Master Record, Wilbur Smith Associates

COMMERCIAL SERVICE CONSIDERATIONS

Two of Vermont's public-use airports provide commercial service, Burlington International and Rutland State. Burlington International has historically been the primary provider of commercial service of the Vermont system airports. In 2004, Burlington International enplaned approximately 1.2 million passengers, more than 99 percent of the total enplanements made in Vermont. Burlington International also had more than 94 percent of the total commercial operations in 2004. Rutland State provides several flights a day to connecting hubs in the New England region.

GENERAL AVIATION PROJECTIONS

General aviation activity represents all facets of civil aviation, except activity by certificated air carriers. Projections of based aircraft, fleet mix, and general aviation operations were prepared for the system airports in the State of Vermont. These terms are defined as follows:

- Based aircraft - The total number of active general aviation aircraft that are either hangared or tied down at the airport.

- Fleet mix - The type of aircraft that operate or are based at an airport (i.e. single-engine, multi-engine, jet, etc.).

- Operations - An operation is defined as a landing or a takeoff; both a landing and a takeoff, such as a touch-and-go, account for two operations.

BASED AIRCRAFT PROJECTIONS

Four methodologies were explored as possible tools to project based aircraft at each system airport. The first methodology used to project based aircraft was a top down methodology. This methodology projected statewide based aircraft using a market share approach. The second methodology used a socioeconomic approach based on projected county population growth. The third methodology also used a socioeconomic approach based on county employment estimates. The last methodology involved applying various growth rates to the based aircraft in each role, based upon FAA projections of the future nationwide general aviation fleet mix. Each of these methodologies, their resultant projections, and the preferred based aircraft projections are discussed in the following sections.

Market Share Methodology: Share of U.S. Total Active General Aviation Aircraft

The first methodology used to project based aircraft was a top down approach. For this methodology, Vermont's share of total U.S. active general aviation aircraft in 2005 was assumed to remain constant throughout the forecast period. Based on this assumption and using the *FAA Aerospace Forecasts Fiscal Years 2005-2016* national forecast of active general aviation aircraft, a statewide projection of based aircraft for Vermont was developed and is presented in **Table 4-7**. Using this approach, statewide based aircraft are projected to increase from 583 in 2005 to 672 in 2025, an average annual growth rate of 0.71 percent. By applying each airport's share of statewide based aircraft in 2005 to the projection of statewide based aircraft over the planning period, individual airport projections were produced as presented in **Table 4-8**.

Table 4-7
Projections of Statewide Based Aircraft
U.S. Market Share Methodology

	2005	%	2010	2015	2025
FAA U.S. Active Aircraft Fleet	219,780	100%	230,335	238,645	253,284
Vermont	583	0.27%	611	633	672

Source: *FAA Aerospace Forecasts Fiscal Years 2005-2016,* Wilbur Smith Associates

Table 4-8
Projections of Based Aircraft
Vermont Market Share Methodology

Airport Name	City	2005 Based Aircraft	Airport % Of VT Total	Projected Based Aircraft 2010	2015	2025
Basin Harbor	Vergennes	0	0.0%	0	0	0
Burlington International	Burlington	63	10.8%	66	68	73
Caledonia County State	Lyndonville	19	3.3%	20	21	22
Edward F. Knapp State	Barre/Montpelier	60	10.3%	63	65	69
Fair Haven Municipal	Fair Haven	2	0.3%	2	2	2
Franklin County State	Highgate	53	9.1%	56	58	61
Hartness State	Springfield	37	6.3%	39	40	43
John H. Boylan State	Island Pond	1	0.2%	1	1	1
Middlebury State	Middlebury	50	8.6%	52	54	58
Morrisville-Stowe State	Morrisville	28	4.8%	29	30	32
Mount Snow	West Dover	7	1.2%	7	8	8
Newport State	Newport	17	2.9%	18	18	20
Post Mills	Post Mills	29	5.0%	30	31	33
Rutland State	Rutland	41	7.0%	43	45	47
Shelburne	Shelburne	56	9.6%	59	61	65
Warren-Sugarbush	Warren	70	12.0%	73	76	81
William H. Morse	Bennington	50	8.6%	52	54	58
All Airports		**583**	**100.0%**	**611**	**633**	**672**

Source: Wilbur Smith Associates

Socioeconomic Methodology: County Population Projections

The second methodology used to project based aircraft used Vermont's projected population growth. Population projections on a state and county level were developed for Vermont by MISER. From these projections, a ratio of population per based aircraft was calculated for each county in Vermont. This methodology assumes that each county's ratio will remain the same over the forecast period. The MISER report projects population through 2020. A population projection for 2025 was extrapolated from the growth implied in the projections prepared by MISER between 2015 and 2020. The projected county-specific based aircraft were then applied to the airports located in each county. This was accomplished using each airport's current share of the county's based aircraft.

The results of this methodology are presented in **Table 4-9**. Statewide based aircraft are projected to reach 639 by 2025, up from a current level of 583. This represents an average annual growth of 0.46 percent.

Socioeconomic Methodology: County Employment Projections

The third methodology examined to project based aircraft applied the same approach as described above, however, the ratio of employment per based aircraft was used instead of population per based aircraft. The projected county based aircraft were applied to the airports located in each county, using each airport's current share of the county's based aircraft. The results of this methodology are presented in **Table 4-10**. As shown, using this methodology, statewide based aircraft are projected to increase from 583 to 722 in 2025, an average annual growth rate of 1.1 percent.

Table 4-9
Projections of Based Aircraft
Projected Statewide Population Growth Methodology

County / City	Airport Name	Population Projections					2005 BA	Pop. Per BA	Projected Based Aircraft		
		2005*	2010	2015	2020	2025 Extrapolated			2010	2015	2025
Addison County		37,052	37,907	38,805	39,813	40,848	**50**	741	**52**	**53**	**56**
Vergennes	Basin Harbor						0		0	0	0
Middlebury	Middlebury State						50		50	53	56
Bennington County		37,295	37,420	37,530	37,694	37,860	**50**	746	**51**	**51**	**51**
Bennington	William H. Morse						50		51	51	51
Caledonia County		30,455	31,121	31,816	32,550	33,301	**19**	1,603	**20**	**20**	**21**
Lyndonville	Caledonia County State						19		20	20	21
Chittenden County		152,846	157,471	161,491	165,813	170,250	**119**	1,284	**123**	**126**	**133**
Burlington	Burlington International						63		65	67	70
Shelburne	Shelburne						56		58	59	63
Essex County		6,603	6,711	6,848	6,981	7,116	**1**	6,603	**2**	**2**	**2**
Island Pond	John H. Boylan State						1		2	2	2
Franklin County		47,617	49,583	51,701	54,065	56,537	**53**	898	**56**	**58**	**63**
Highgate	Franklin County State						53		56	58	63
Lamoille County		24,442	25,601	26,756	27,898	29,088	**28**	843	**30**	**31**	**34**
Morrisville	Morrisville-Stowe State						28		31	32	35
Orange County		28,976	29,544	30,122	30,737	31,365	**29**	999	**30**	**31**	**32**
Post Mills	Post Mills						29		30	31	32
Orleans County		26,899	27,453	28,009	28,562	29,127	**17**	1,582	**18**	**18**	**19**
Newport	Newport State						17		18	18	19
Rutland County		63,936	64,255	64,637	65,030	65,427	**43**	1,487	**44**	**44**	**45**
Fair Haven	Fair Haven Municipal						2		2	2	2
Rutland	Rutland State						41		42	42	43
Washington County		59,141	59,931	60,636	61,322	62,016	**130**	455	**132**	**134**	**137**
Barre/Montpelier	Edward F. Knapp State						60		61	62	63
Warren	Warren-Sugarbush						70		71	72	74
Windham County		45,093	45,769	46,455	47,171	47,899	**7**	6,442	**8**	**8**	**8**
West Dover	Mount Snow						7		8	8	8
Windsor County		58,154	58,553	58,960	59,446	59,936	**37**	1,572	**38**	**38**	**39**
Springfield	Hartness State						37		38	38	39
Total--All Vermont Airports		**618,511**	**631,319**	**643,765**	**657,083**	**670,677**	**583**	1,061	**604**	**614**	**639**

Source: Massachusetts Institute for Social and Economic Research, Wilbur Smith Associates

Table 4-10
Projections of Based Aircraft
Projected Statewide Employment Growth

County / City	Airport Name	2005*	Projected Employment 2010	Projected Employment 2015	Projected Employment 2025	2005 Based Aircraft	Employment Per BA	Projected Based Aircraft 2010	Projected Based Aircraft 2015	Projected Based Aircraft 2025
Addison County		20,550	22,217	24,019	28,075	**50**	411	**55**	**59**	**69**
Vergennes	Basin Harbor					0		0	0	0
Middlebury	Middlebury State					50		55	59	69
Bennington County		19,900	20,875	21,899	24,098	**50**	398	**53**	**56**	**61**
Bennington	William H. Morse					50		53	56	61
Caledonia County		16,800	17,827	18,918	21,303	**19**	884	**21**	**22**	**25**
Lyndonville	Caledonia County State					19		21	22	25
Chittenden County		86,300	91,325	96,642	108,223	**119**	725	**126**	**134**	**150**
Burlington	Burlington International					63		67	71	79
Shelburne	Shelburne					56		59	63	71
Essex County		3,350	3,403	3,458	3,569	**1**	3,350	**2**	**2**	**2**
Island Pond	John H. Boylan State					1		2	2	2
Franklin County		25,100	26,459	27,891	30,992	**53**	474	**56**	**59**	**66**
Highgate	Franklin County State					53		56	59	66
Lamoille County		14,900	15,876	16,916	19,204	**29**	514	**30**	**32**	**37**
Morrisville	Morrisville-Stowe State					29		31	33	38
Orange County		16,000	16,863	17,772	19,740	**29**	552	**31**	**33**	**36**
Post Mills	Post Mills					29		31	33	36
Orleans County		14,600	15,359	16,158	17,883	**17**	859	**18**	**19**	**21**
Newport	Newport State					17		18	19	21
Rutland County		34,550	35,431	36,334	38,211	**43**	803	**45**	**46**	**48**
Fair Haven	Fair Haven Municipal					2		2	2	2
Rutland	Rutland State					41		43	44	46
Washington County		30,900	32,089	33,324	35,938	**130**	238	**136**	**141**	**152**
Barre/Montpelier	Edward F. Knapp State					60		63	65	70
Warren	Warren-Sugarbush					70		73	76	82
Windham County		25,150	26,344	27,595	30,278	**7**	3,593	**8**	**8**	**9**
West Dover	Mount Snow					7		8	8	9
Windsor County		32,100	33,790	35,569	39,413	**37**	868	**39**	**41**	**46**
Springfield	Hartness State					37		39	41	46
Total--All Vermont Airports		**340,200**	**357,859**	**376,495**	**416,927**	**583**	584	**620**	**652**	**722**

Source: Wilbur Smith Associates

FAA Forecasted General Aviation Fleet Methodology: Airport Roles

The final methodology for projecting based aircraft used a bottom-up approach. For this methodology, a compound annual growth rate was calculated for each of the four roles, as determined in Chapter Three. This methodology involved several steps utilizing the *FAA Aerospace Forecasts, Fiscal Years 2005-2016*, which provides growth rates for various categories of aircraft. The FAA average annual growth rates for the aircraft categories are:

- Single-Engine – 0.24 percent
- Multiengine (Piston and Turbine) – 0.24 percent
- Turbo Jet – 5.58 percent
- Rotorcraft – 1.14 percent
- Experimental/Sport/Gliders – 1.85 percent

For each of the roles, based aircraft in each of the five categories were summed. A percentage of the total based aircraft in each role was then calculated for each of the five categories. This percentage was then multiplied by the corresponding FAA growth rate for the specified category to create a weighted growth rate for each category. The weighted percentages were then summed for each role. This total represents each role's CAGR, which was then applied to the based aircraft at each of the airports in that role. Statewide based aircraft are projected using this methodology to reach 668 by 2025, as depicted in Table 4-11, an increase of 85 over the 20-year period. This represents an average annual growth of 0.68 percent.

Table 4-11
Projections of Based Aircraft
Airport Roles

Aircraft Type		Single-Engine	Multiengine	Jet	Helicopter	Experimental /Sport/Other	2005 Based Aircraft	CAGR	2010	2015	2025
FAA Growth Rate 05'-16'		0.24%	0.24%	5.58%	1.14%	1.85%					
Airport Name	**City**										
Specialty Airports								**0.43%**			
Basin Harbor	Vergennes	0	0	0	0	0	0		0	0	0
John H. Boylan State	Island Pond	0	0	0	0	1	1		2	2	2
Fair Haven Municipal	Fair Haven	2	0	0	0	0	2		3	3	3
Shelburne	Shelburne	50	0	0	0	6	56		58	59	62
	Total	**52**	**0**	**0**	**0**	**7**	**59**		**63**	**64**	**67**
	% of all Aircraft	**88%**	**0%**	**0%**	**0%**	**12%**					
	Weighted %	**0.21%**	**0.00%**	**0.00%**	**0.00%**	**0.22%**					
Local Service								**0.73%**			
Mount Snow	West Dover	5	2	0	0	0	7		8	8	9
Newport State	Newport	15	2	0	0	0	17		18	19	20
Caledonia County State	Lyndonville	19	0	0	0	0	19		20	21	23
Post Mills	Post Mills	20	0	0	0	9	29		31	32	34
Middlebury State	Middlebury	42	3	3	0	2	50		52	54	58
Franklin County State	Highgate	46	1	0	1	5	53		55	58	62
Warren-Sugarbush	Warren	20	0	0	0	50	70		73	76	82
	Total	**167**	**8**	**3**	**1**	**66**	**245**		**257**	**268**	**288**
	% of all Aircraft	**68%**	**3%**	**1%**	**0%**	**27%**					
	Weighted %	**0.16%**	**0.01%**	**0.07%**	**0.00%**	**0.50%**					
Regional Service								**0.55%**			
Morrisville-Stowe State	Morrisville	18	2	0	0	8	28		29	30	32
Hartness S	Springfield	28	1	0	0	8	37		39	40	42
William H. Morse	Bennington	24	18	0	2	6	50		52	53	56
	Total	**70**	**21**	**0**	**2**	**22**	**115**		**120**	**123**	**130**
	% of all Aircraft	**61%**	**18%**	**0%**	**2%**	**19%**					
	Weighted %	**0.15%**	**0.04%**	**0.00%**	**0.02%**	**0.35%**					

Table 4-11
Projections of Based Aircraft
Airport Roles, Continued

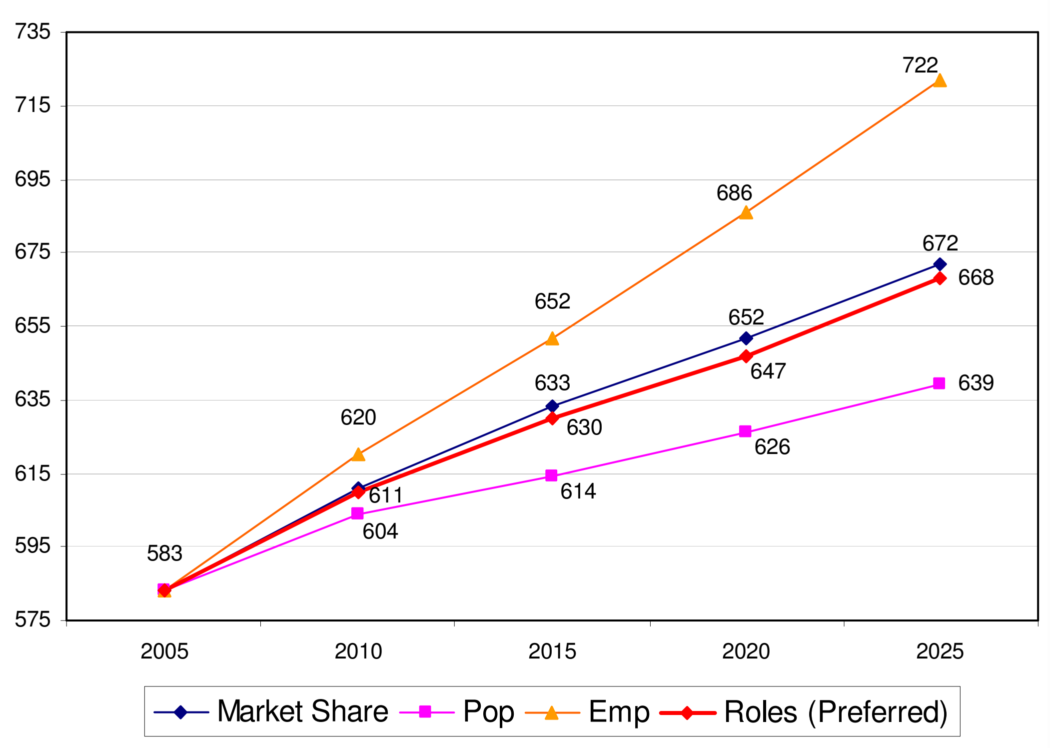
Aircraft Type		Single-Engine	Multiengine	Jet	Helicopter	Experimental /Sport/Other	2005 Based Aircraft	CAGR	2010	2015	2025
FAA Growth Rate 05'-16'		0.24%	0.24%	5.58%	1.14%	1.85%					
National Service								0.49%			
Rutland State	Rutland	33	3	2	2	1	41		43	44	46
Edward F. Knapp State	Barre/Montpelier	55	5	0	0	0	60		62	64	67
Burlington International	Burlington	48	9	5	1	0	63		65	67	70
	Total	**136**	**17**	**7**	**3**	**1**	**164**		**170**	**175**	**183**
	% of all Aircraft	**83%**	**10%**	**4%**	**2%**	**1%**					
	Weighted %	**0.20%**	**0.02%**	**0.24%**	**0.02%**	**0.01%**					
All Airports							**583**		**610**	**630**	**668**

Source: Wilbur Smith Associates

PREFERRED BASED AIRCRAFT PROJECTIONS

The results from the four based aircraft projection methodologies in the system plan were compared for each airport. **Exhibit 4-4** graphically presents the results of the four methodologies and how they compare to one another. For this study, the airport roles method was selected as the preferred approach for forecasting based aircraft. **Table 4-12** presents each airport's preferred based aircraft projection throughout the planning period. This methodology produced a 2025 projection of 668 based aircraft. This represents an average annual growth rate of 0.68 percent.

Exhibit 4-4
Projections of Based Aircraft at Vermont System Airports



Source: Wilbur Smith Associates

Table 4-12
Preferred Based Aircraft Projections

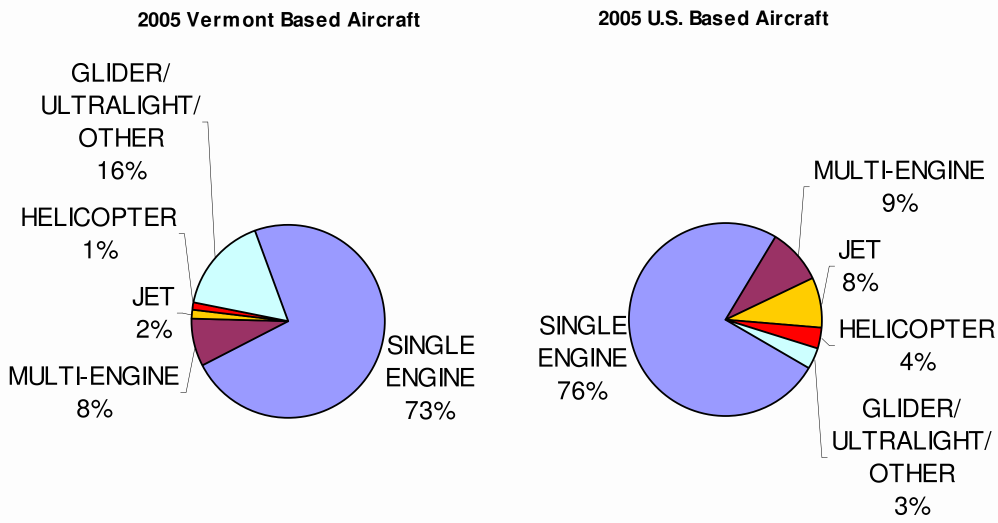
Airport Name	City	2005 Based Aircraft	2010	2015	2025
Basin Harbor	Vergennes	0	0	0	0
Burlington International	Burlington	63	65	67	70
Caledonia County State	Lyndonville	19	20	21	23
Edward F. Knapp State	Barre/Montpelier	60	62	64	67
Fair Haven Municipal	Fair Haven	2	3	3	3
Franklin County State	Highgate	53	55	58	62
Hartness State	Springfield	37	39	40	42
John H. Boylan State	Island Pond	1	2	2	2
Middlebury State	Middlebury	50	52	54	58
Morrisville-Stowe State	Morrisville	28	29	30	32
Mount Snow	West Dover	7	8	8	9
Newport State	Newport	17	18	19	20
Post Mills	Post Mills	29	31	32	34
Rutland State	Rutland	41	43	44	46
Shelburne	Shelburne	56	58	59	62
Warren-Sugarbush	Warren	70	73	76	82
William H. Morse	Bennington	50	52	53	56
All Vermont Airports		**583**	**610**	**630**	**668**

Source: Wilbur Smith Associates

BASED AIRCRAFT FLEET MIX

In projecting the statewide based aircraft fleet mix for Vermont, consideration was given to the continually changing national active general aviation aircraft fleet and the existing fleet mix in the State. **Exhibit 4-5** presents the based aircraft fleet mix for Vermont and the active general aviation aircraft fleet in the U.S. In 2005, single-engine aircraft accounted for 73 percent of the based aircraft fleet at all public-use airports in Vermont, comparable to single-engine aircraft comprising 76 percent of the total U.S. fleet. The percentage of gliders, ultra-lights, and other sport aviation aircraft based in Vermont is much higher than the three percent in the active U.S. fleet, totaling 16 percent. The share of multiengine, jet, helicopter and other aircraft of the total active fleet was higher than the share at Vermont airports.

Exhibit 4-5
Comparison of 2005 Vermont and U.S. Based Aircraft by Type



Sources: Wilbur Smith Associates; *FAA Aerospace Forecasts Fiscal Years 2005-2016*

The FAA asserts in the *FAA Aerospace Forecasts FY 2005-2016* that there will be strong growth in active general aviation jet aircraft during the forecast period. This trend illustrates a movement in the general aviation community toward more sophisticated, higher performing, and more demanding aircraft. This trend will impact the types of activity occurring at general aviation airports and the types of facilities required at those airports. The FAA projects that the percentage increase in jet aircraft will significantly outpace growth in other components of the aircraft fleet. Single-engine aircraft are projected to experience an average annual growth rate of 0.2 percent per year over the forecast period, while the total number of multi-engine piston aircraft is projected to decline at an average annual growth rate of 0.2 percent.

For this analysis, statewide based aircraft fleet mix was projected for 2010, 2015, and 2025. **Tables 4-13, 4-14,** and **4-15** present the based aircraft fleet mix for Vermont for these years respectively. It is projected that single-engine aircraft, which comprise 73 percent of all based aircraft in the State, will decline over the next 20 years to 69 percent by 2025. Jet aircraft are projected to experience an increase of 2 percent by 2025, and will comprise 4 percent of Vermont's total based aircraft in 2025. Experimental and sport aircraft are projected to increase from 96 for 2005 to 130 in 2025, and will comprise 19 percent of Vermont's based aircraft. **Table 4-16** presents the total number of aircraft types for the whole State by milestone projection year.

Table 4-13
2010 Projections of Based Aircraft Fleet Mix

Airport Name	City	Single Engine	Multi-Engine	Jet	Helicopter	Experimental/ Sport/Other	Total
Basin Harbor	Vergennes	0	0	0	0	0	0
Burlington International	Burlington	49	9	6	1	0	65
Caledonia County State	Lyndonville	20	0	0	0	0	20
Edward F. Knapp State	Barre/Montpelier	56	5	1	0	0	62
Fair Haven Municipal	Fair Haven	3	0	0	0	0	3
Franklin County State	Highgate	47	1	0	1	6	55
Hartness State	Springfield	29	1		0	9	39
John H. Boylan State	Island Pond	1	0	0	0	1	2
Middlebury State	Middlebury	43	3	3	0	3	52
Morrisville-Stowe State	Morrisville	19	2	0	0	8	29
Mount Snow	West Dover	6	2	0	0	0	8
Newport State	Newport	16	2	0	0	0	18
Post Mills	Post Mills	21	0	0	0	10	31
Rutland State	Rutland	34	3	3	2	1	43
Shelburne	Shelburne	51	0	0	0	7	58
Warren-Sugarbush	Warren	21	0	0	0	52	73
William H. Morse	Bennington	25	18	0	2	7	52
All Airports		**441**	**46**	**13**	**6**	**104**	**610**

Source: Wilbur Smith Associates

Table 4-14
2015 Projections of Based Aircraft Fleet Mix

Airport Name	City	Single Engine	Multi-Engine	Jet	Helicopter	Experimental/ Sport/Other	Total
Basin Harbor	Vergennes	0	0	0	0	0	0
Burlington International	Burlington	50	9	7	1	0	67
Caledonia County State	Lyndonville	20	0	0	0	1	21
Edward F. Knapp State	Barre/Montpelier	57	6	1	0	0	64
Fair Haven Municipal	Fair Haven	3	0	0	0	0	3
Franklin County State	Highgate	47	1	0	1	9	58
Hartness State	Springfield	30	1		0	9	40
John H. Boylan State	Island Pond	1	0	0	0	1	2
Middlebury State	Middlebury	44	3	3	0	4	54
Morrisville-Stowe State	Morrisville	19	2	0	0	9	30
Mount Snow	West Dover	6	2	0	0	0	8
Newport State	Newport	17	2	0	0	0	19
Post Mills	Post Mills	21	0	0	0	11	32
Rutland State	Rutland	34	3	4	2	1	44
Shelburne	Shelburne	51	0	0	0	8	59
Warren-Sugarbush	Warren	21	0	0	0	55	76
William H. Morse	Bennington	26	18	0	2	7	53
All Airports		**447**	**47**	**15**	**6**	**115**	**630**

Sources: Wilbur Smith Associates

Table 4-15
2025 Projections of Based Aircraft Fleet Mix

Airport Name	City	Single Engine	Multi-Engine	Jet	Helicopter	Experimental/ Sport/Other	Total
Basin Harbor	Vergennes	0	0	0	0	0	0
Burlington International	Burlington	50	9	9	2	0	70
Caledonia County State	Lyndonville	21	0	0	0	2	23
Edward F. Knapp State	Barre/Montpelier	58	6	3	0	0	67
Fair Haven Municipal	Fair Haven	3	0	0	0	0	3
Franklin County State	Highgate	49	2	0	1	10	62
Hartness State	Springfield	30	1	2	0	9	42
John H. Boylan State	Island Pond	1	0	0	0	1	2
Middlebury State	Middlebury	46	3	3	0	6	58
Morrisville-Stowe State	Morrisville	20	2	0	0	10	32
Mount Snow	West Dover	7	2	0	0	0	9
Newport State	Newport	17	2	1	0	0	20
Post Mills	Post Mills	22	0	0	0	12	34
Rutland State	Rutland	34	3	6	2	1	46
Shelburne	Shelburne	51	0	0	0	11	62
Warren-Sugarbush	Warren	23	0	0	0	59	82
William H. Morse	Bennington	26	18	1	2	9	56
All Airports		**458**	**48**	**25**	**7**	**130**	**668**

Source: Wilbur Smith Associates

Table 4-16
Vermont Preferred Based Aircraft Fleet Mix Projection

Year	Single Engine	%	Multi-Engine	%	Jet	%	Helicopter	%	Experimental/ Sport/Other	%	Total
2005	425	73%	46	8%	10	2%	6	1%	96	16%	583
2010	441	72%	46	8%	13	2%	6	1%	104	17%	610
2015	447	71%	47	7%	15	2%	6	1%	115	18%	630
2025	458	69%	48	7%	25	4%	7	1%	130	19%	668

Source: Wilbur Smith Associates

GENERAL AVIATION OPERATIONS PROJECTIONS

The projection of operational demand at an airport determines the need for airside improvements. Total annual operational demand can consist of several types of activity including air carrier, military, air taxi, and general aviation. For those airports with scheduled commercial air service, air carrier activity is projected separately in a subsequent section. For those airports with annual military operations, the military operations were subtracted from the total operational estimate, as were commercial operations, to arrive at a total annual general aviation activity level for each system airport. Air taxi operations are included in the general aviation operations projections.

Due to the inherent limitations in the historic data for general aviation operations data as discussed previously, it was not possible to develop projections based on historical general aviation operational growth. Three methodologies were investigated to project general aviation operations for 2010, 2015, and 2025. These methodologies include an operations per based aircraft (OPBA) methodology, a socioeconomic methodology using population projections, and a socioeconomic methodology using employment projections. These three methodologies are discussed in detail in the following sections. It is important to note that due to the estimates of operational activity, all projections are rounded to the nearest hundred.

Operations Per Based Aircraft (OPBA)

The first methodology, the OPBA methodology, uses each airport's preferred projected number of based aircraft and multiplies the number by the 2005 OPBA ratio to yield projected total annual general aviation aircraft operations. The preferred based aircraft projections (Table 4-12) previously presented were used for this projection technique. Statewide, an OPBA of 461 was the average, with the highest OPBA at Mount Snow, with 943. Shelburne had the lowest OPBA with 54, after Basin Harbor which has no based aircraft resulting in an OPBA of zero. It should be noted, that as a result of Basin Harbor having no based aircraft, its operations are projected to remain constant throughout the planning period. Each airport's 2005 OPBA was held constant throughout the planning period to develop projections of annual operations. **Table 4-17** presents the results of this methodology.

As shown, current statewide general aviation operations are estimated at 268,938. The OPBA methodology produced a projection of nearly 306,800 general aviation operations by 2025. Using the OPBA methodology, statewide annual general aviation operations are projected to grow at an average annual rate of 0.66 percent over the planning period.

Socioeconomic Methodology: County Population Projections

The second methodology used the same approach as forecasting based aircraft using projected statewide population. A ratio of operations to population was developed for each county for 2005. This ratio was applied to projected population to produce projections of general aviation operations by county. As shown in **Table 4-18**, each airport was assigned a portion of these projected operations based on its current reported share of total county general aviation operations. Using this methodology, statewide general aviation operations are projected to reach nearly 291,600 by 2025, up 0.41 percent per year on average.

Socioeconomic Methodology: County Employment Projections

The third methodology used the same approach above to forecast future operations, but used projected statewide employment. A ratio of operations to employment was developed for each county for 2005. This ratio was applied to projected employment to produce projections of general aviation operations by county. As shown in **Table 4-19**, each airport was assigned a portion of these projected operations based on its current reported share of total county general aviation operations. Using this methodology, statewide general aviation operations are projected to reach nearly 330,100 by 2025, up 1.0 percent per year on average.

Table 4-17
Projections of Operations
OPBA Methodology

Airport Name	City	Based Aircraft	2005 Operations	2005 OPBA	Preferred Projected Based Aircraft			Projected Operations		
					2010	2015	2025	2010	2015	2025
Basin Harbor	Vergennes	0	2,000	0	0	0	0	2,000	2,000	2,000
Burlington International	Burlington	63	53,312	846	65	67	70	55,000	56,700	59,200
Caledonia County State	Lyndonville	19	2,050	108	20	21	23	2,200	2,300	2,500
Edward F. Knapp State	Barre/Montpelier	60	31,000	517	62	64	67	32,000	33,100	34,600
Fair Haven Municipal	Fair Haven	2	400	200	3	3	3	600	600	600
Franklin County State	Highgate	53	19,900	375	55	58	62	20,700	21,800	23,300
Hartness State	Springfield	37	9,200	249	39	40	42	9,700	9,900	10,400
John H. Boylan State	Island Pond	1	200	200	2	2	2	400	400	400
Middlebury State	Middlebury	50	31,450	629	52	54	58	32,700	34,000	36,500
Morrisville-Stowe State	Morrisville	28	17,520	626	29	30	32	18,100	18,800	20,000
Mount Snow	West Dover	7	6,600	943	8	8	9	7,500	7,500	8,500
Newport State	Newport	17	6,960	409	18	19	20	7,400	7,800	8,200
Post Mills	Post Mills	29	9,510	328	31	32	34	10,200	10,500	11,100
Rutland State	Rutland	41	26,936	657	43	44	46	28,200	28,900	30,200
Shelburne	Shelburne	56	3,000	54	58	59	62	3,100	3,200	3,300
Warren-Sugarbush	Warren	70	22,500	321	73	76	82	23,500	24,400	26,400
William H. Morse	Bennington	50	26,400	528	52	53	56	27,500	28,000	29,600
All Airports		**583**	**268,938**	**461**	**610**	**630**	**668**	**280,800**	**289,900**	**306,800**

Source: Wilbur Smith Associates

Table 4-18
Projections of Operations
Population Growth Methodology

County / City	Airport Name	Projected Population 2005*	2010	2015	2025	2005 Operations	Pop. Per Ops.	Market Share	2010	2015	2025
Addison County		37,052	37,907	38,805	40,848	**33,450**	1.11		**34,200**	**35,000**	**36,900**
Vergennes	Basin Harbor					2,000		0.06	2,045	2,093	2,206
Middlebury	Middlebury State					31,450		0.94	32,155	32,907	34,694
Bennington County		37,295	37,420	37,530	37,860	**26,400**	1.41		**26,500**	**26,600**	**26,800**
Bennington	William H. Morse					26,400			27,700	29,100	32,000
Caledonia County		30,455	31,121	31,816	33,301	**2,050**	14.86		**2,100**	**2,100**	**2,200**
Lyndonville	Caledonia County State					2,050			2,200	2,400	2,600
Chittenden County		152,846	157,471	161,491	170,250	**56,312**	2.71		**58,000**	**59,500**	**62,700**
Burlington	Burlington International					53,312		0.95	54,910	56,330	59,360
Shelburne	Shelburne					3,000		0.05	3,090	3,170	3,340
Essex County		6,603	6,711	6,848	7,116	**200**	33.02		**200**	**200**	**200**
Island Pond	John H. Boylan State					200			300	300	300
Franklin County		47,617	49,583	51,701	56,537	**19,900**	2.39		**20,700**	**21,600**	**23,600**
Highgate	Franklin County State					19,900			21,000	22,200	24,600
Lamoille County		24,442	25,601	26,756	29,088	**17,520**	1.40		**18,400**	**19,200**	**20,800**
Morrisville	Morrisville-Stowe State					17,520			18,700	19,900	22,600
Orange County		28,976	29,544	30,122	31,365	**9,510**	3.05		**9,700**	**9,900**	**10,300**
Post Mills	Post Mills					9,510			10,100	10,600	11,800
Orleans County		26,899	27,453	28,009	29,127	**6,960**	3.86		**7,100**	**7,200**	**7,500**
Newport	Newport State					6,960			7,400	7,800	8,600
Rutland County		63,936	64,255	64,637	65,427	**27,336**	2.34		**27,500**	**27,600**	**28,000**
Fair Haven	Fair Haven Municipal					400		0.01	402	404	410
Rutland	Rutland State					26,936		0.99	27,098	27,196	27,590
Washington County		59,141	59,931	60,636	62,016	**53,500**	1.11		**54,200**	**54,900**	**56,100**
Barre/Montpelier	Edward F. Knapp State					31,000		0.58	31,406	31,811	32,507
Warren	Warren-Sugarbush					22,500		0.42	22,794	23,089	23,593
Windham County		45,093	45,769	46,455	47,899	**6,600**	6.61		**6,673**	**6,769**	**6,963**
West Dover	Mount Snow					6,600			6,673	6,769	6,963

Table 4-18
Projections of Operations
Population Growth Methodology, Continued

County / City	Airport Name	Projected Population 2005*	2010	2015	2025	2005 Operations	Pop. Per Ops.	Market Share	2010	2015	2025
Windsor County		58,154	58,553	58,960	59,936	**9,200**	6.83		**9,300**	**9,300**	**9,500**
Springfield	Hartness State					9,200			9,700	10,200	11,300
All Vermont Airports		**618,511**	**631,319**	**643,765**	**670,677**	**268,938**			**274,600**	**279,900**	**291,600**

Source: Massachusetts Institute for Social and Economic Research, Wilbur Smith Associates

Table 4-19
Projections of Operations
Employment Growth Methodology

County / City	Airport Name	2005*	Projected Employment 2010	2015	2025	2005 Operations	Emp. Per Ops.	Market Share	Projected Operations 2010	2015	2025
Addison County		20,550	22,217	24,019	28,075	**33,450**	0.61		**36,200**	**39,100**	**45,700**
Vergennes	Basin Harbor					2,000		0.06	2,164	2,338	2,732
Middlebury	Middlebury State					31,450		0.94	34,036	36,762	42,968
Bennington County		19,900	20,875	21,899	24,098	**26,400**	0.75		**27,700**	**29,100**	**32,000**
Bennington	William H. Morse					26,400			27,700	29,100	32,000
Caledonia County		16,800	17,827	18,918	21,303	**2,050**	8.20		**2,200**	**2,300**	**2,600**
Lyndonville	Caledonia County State					2,050			2,200	2,400	2,600
Chittenden County		86,300	91,325	96,642	108,223	**56,312**	1.53		**59,600**	**63,100**	**70,600**
Burlington	Burlington International					53,312		0.95	56,425	59,738	66,839
Shelburne	Shelburne					3,000		0.05	3,175	3,362	3,761
Essex County		3,350	3,403	3,458	3,569	**200**	16.75		**200**	**200**	**200**
Island Pond	John H. Boylan State					200			300	300	300
Franklin County		25,100	26,459	27,891	30,992	**19,900**	1.26		**21,000**	**22,100**	**24,600**
Highgate	Franklin County State					19,900			21,000	22,200	24,600
Lamoille County		14,900	15,876	16,916	19,204	**17,520**	0.85		**18,700**	**19,900**	**22,600**
Morrisville	Morrisville-Stowe State					17,520			18,700	19,900	22,600
Orange County		16,000	16,863	17,772	19,740	**9,510**	1.68		**10,000**	**10,600**	**11,700**
Post Mills	Post Mills					9,510			10,100	10,600	11,800
Orleans County		14,600	15,359	16,158	17,883	**6,960**	2.10		**7,300**	**7,700**	**8,500**
Newport	Newport State					6,960			7,400	7,800	8,600
Rutland County		34,550	35,431	36,334	38,211	**27,336**	1.26		**28,000**	**28,700**	**30,200**
Fair Haven	Fair Haven Municipal					400		0.01	410	420	442
Rutland	Rutland State					26,936		0.99	27,590	28,280	29,758

Table 4-19
Projections of Operations
Employment Growth Methodology, Continued

County / City	Airport Name	2005*	Projected Employment 2010	Projected Employment 2015	Projected Employment 2025	2005 Operations	Emp. Per Ops.	Market Share	Projected Operations 2010	Projected Operations 2015	Projected Operations 2025
Washington County		30,900	32,089	33,324	35,938	**53,500**	0.58		**55,600**	**57,700**	**62,200**
Barre/Montpelier	Edward F. Knapp State					31,000		0.58	32,217	33,434	36,041
Warren	Warren-Sugarbush					22,500		0.42	23,383	24,266	26,159
Windham County		25,150	26,344	27,595	30,278	**6,600**	3.81		**6,866**	**7,253**	**7,930**
West Dover	Mount Snow					6,600			6,866	7,253	7,930
Windsor County		32,100	33,790	35,569	39,413	9,200	3.49		**9,700**	**10,200**	**11,300**
Springfield	Hartness State					9,200			9,700	10,200	11,300
All Vermont Airports		**340,200**	**357,859**	**376,495**	**416,927**	**268,938**			**283,100**	**297,900**	**330,100**

Source: *2005 Vermont Department of Labor
CAGR 05'-25' provided by Woods and Poole 2005

PREFERRED GENERAL AVIATION OPERATIONS PROJECTION METHODOLOGY

Three methodologies were tested to project general aviation operations at system airports. The OPBA was chosen as the preferred methodology for projecting future operations at Vermont system airports. **Exhibit 4-6** graphically presents the three methodologies tested and how the projected operations compare to one another. **Table 4-20** presents each the preferred projected operations for each airport throughout the study period.

Exhibit 4-6
Projections of General Aviation Operations
at Vermont System Airports

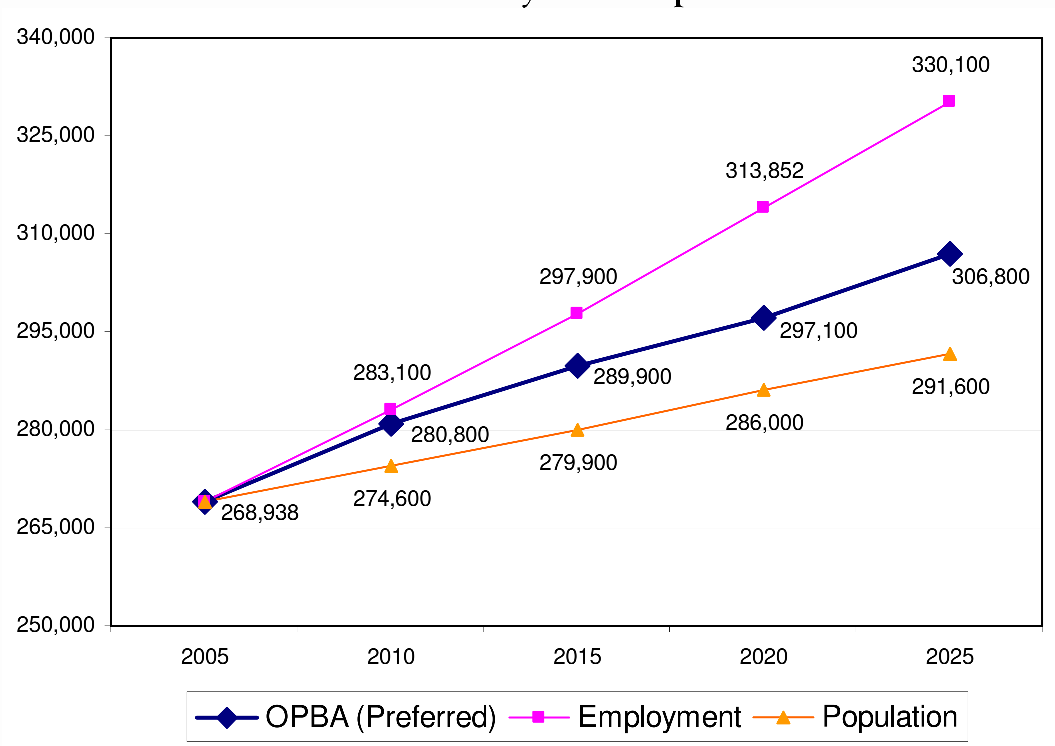


Table 4-20
Preferred General Aviation Operations

Airport Name	City	2005	2010	2015	2025
Basin Harbor	Vergennes	2,000	2,000	2,000	2,000
Burlington International	Burlington	53,312	55,000	56,700	59,200
Caledonia County State	Lyndonville	2,050	2,200	2,300	2,500
Edward F. Knapp State	Barre/Montpelier	31,000	32,000	33,100	34,600
Fair Haven Municipal	Fair Haven	400	600	600	600
Franklin County State	Highgate	19,900	20,700	21,800	23,300
Hartness State	Springfield	9,200	9,700	9,900	10,400
John H. Boylan State	Island Pond	200	400	400	400
Middlebury State	Middlebury	31,450	32,700	34,000	36,500
Morrisville-Stowe State	Morrisville	17,520	18,100	18,800	20,000
Mount Snow	West Dover	6,600	7,500	7,500	8,500
Newport State	Newport	6,960	7,400	7,800	8,200
Post Mills	Post Mills	9,510	10,200	10,500	11,100
Rutland State	Rutland	26,936	28,200	28,900	30,200
Shelburne	Shelburne	3,000	3,100	3,200	3,300
Warren-Sugarbush	Warren	22,500	23,500	24,400	26,400
William H. Morse	Bennington	26,400	27,500	28,000	29,600
All Airports		**268,938**	**280,800**	**289,900**	**306,800**

Source: Wilbur Smith Associates

Commercial Service Activity Projections

Commercial service activity occurs at two of the 17 public-use airports in Vermont; Burlington International and Rutland State Airports. As mentioned in Chapter One, the on-going FAA New England Regional Aviation System Plan (NERASP) provides detailed forecasts of commercial activity at Burlington International Airport. In addition, a Runway Safety Area Study completed in 2005 for Rutland State by URS Corporation provides airport-specific forecasts of commercial activity. As a result, these sources are used to provide forecasts of commercial activity.

Burlington International Airport

Burlington International is one of several airports that are included in the NERASP. The NERASP provides forecasts of scheduled service operations and annual enplanements for the year 2020, based on historic data from 2004. Burlington International, considered a New England Hub Airport, had 31,135 scheduled service operations in 2004. Scheduled airline operations are projected to increase at an average annual growth rate of 1.3 percent through 2020, for a total of 38,712. This is lower than the average annual growth rate of 2.1 percent for all New England Hub airports included in the NERASP study. This growth rate was used to interpolate an estimate of commercial operations for the year 2005, and projections for 2010 and

2015. This growth rate was also used to extrapolate the number of operations through 2025. The forecasted number of commercial operations for Burlington International is presented in **Table 4-21**.

Table 4-21
Projected Commercial Operations at Burlington International

Historic	Estimated	Projected		
2004	**2005***	**2010***	**2015***	**2025***
31,135	31,562	33,784	36,162	41,433

Note: * Calculated by WSA using NERASP Forecasts for 2020.
Source: New England Regional Aviation System Plan (NERASP)

Burlington International enplaned 1,169,000 passengers in 2004. Enplanements at the airport are expected to increase dramatically through the next five years, at an average annual rate of 6.1 percent to a projected 1,723,000 passengers by 2010. By 2020, it is projected that 2,148,000 enplanements will occur at Burlington, indicating an average annual growth rate of only 2.2 percent between 2010 and 2020, much lower than the first five years of the study period. Enplanements were interpolated for the years 2005 and 2015, and extrapolated for 2025. These projections are presented in **Table 4-22**.

Table 4-22
Projected Enplanements at Burlington International

Historic	Estimated	Projected		
2004	**2005***	**2010**	**2015***	**2025***
1,169,000	1,240,309	1,723,000	1,921,055	2,394,908

Note: * Calculated by WSA from NERASP forecasts
Source: New England Regional Aviation System Plan (NERASP)

RUTLAND STATE AIRPORT

Commercial activity forecasts were recently completed (2005) as part of a Runway Safety Area Study for Rutland State. The study provides forecasts of commercial operations and enplanements through 2015, using airport-specific criteria to develop forecasts utilizing 2004 as a base year. Rutland State had 1,800 scheduled service operations in 2004, or approximately 900 scheduled flights. Scheduled commercial operations are projected to increase by the year 2010 to 2,800, and remain constant through 2015. These forecasts consider that no changes are made in current service at the airport, and that no new flights are made to any additional hubs besides those at the present. As a result, the 2,800 operations will be held constant throughout the rest of the System Plan's study period. The forecasted number of commercial operations for Rutland State are presented in **Table 4-23**.

Table 4-23
Projected Commercial Operations at Rutland State

Historic	Estimated	Projected		
2004	**2005***	**2010**	**2015**	**2025**
1,800	1,938	2,800	2,800	2,800

Note: * Calculated by WSA from Runway Safety Area Study
Source: Rutland State Runway Safety Area Study (URS 2005)

Rutland State Airport enplaned 5,570 passengers in 2004. Passenger traffic increases at Rutland State are assumed to return to those experienced in the 1990s, increasing at an average annual rate of 9.1 percent to a projected 9,440 passengers by 2010. It is projected that by 2015, 13,300 enplanements will occur at Rutland State. As a result of the forecasted operations remaining constant from 2010 to 2015, it has been concluded that the levels of enplanements would also remain constant at approximately 13,300 through 2025. Enplanements were interpolated for the year 2005 by using the average annual growth rate for the years 2004 and 2010. Forecasts of enplanements for Rutland State are presented in **Table 4-24**.

Table 4-24
Projected Enplanements at Rutland State

Historic	Estimated	Projected		
2004	**2005**	**2010**	**2015**	**2025**
5,570	6,082	9,440	13,300	13,300

Note: * Calculated by WSA from Runway Safety Area Study
Source: Rutland State Runway Safety Area Study (URS 2005)

MILITARY ACTIVITY PROJECTIONS

Table 4-25 presents projected military activity for the airports in Vermont. In 2005, military operations occurred at 10 public-use airports in Vermont. Military activity varies with the political climate and variation in government funding of the military. It is projected that the 2005 level of military operations will remain constant throughout the planning period at each airport.

Table 4-25
Military Operations at Public-Use Airports

Airport Name	City	2005	2010	2015	2025
Basin Harbor	Vergennes	100	100	100	100
Burlington International	Burlington	12,171	12,171	12,171	12,171
Edward F Knapp State	Barre/Montpelier	1,000	1,000	1,000	1,000
Franklin County State	Highgate	1,500	1,500	1,500	1,500
Hartness State	Springfield	100	100	100	100
Middlebury State	Middlebury	800	800	800	800
Morrisville-Stowe State	Morrisville	500	500	500	500
Newport State	Newport	180	180	180	180
Rutland State	Rutland	832	832	832	832
William H. Morse State	Bennington	120	120	120	120

Source: FAA 5010 Airport Master Record

SUMMARY

Table 4-26 presents a summary of the forecasts for the airports in Vermont over the planning period. These projections will be used in the next step of the Vermont Airport System Plan to determine the ability of public airports in the State to meet current and future demand.

Table 4-26
Projections of Total Operations at Vermont's Public Use Airports

Airport Name	City	Based Aircraft	GA Operations	Commercial Operations	Military Operations	Total Operations
	Year					
Basin Harbor	Vergennes					
	2005	0	2,000		100	2,100
	2010	0	2,000		100	2,100
	2015	0	2,000		100	2,100
	2025	0	2,000		100	2,100
Burlington International	Burlington					
	2005	63	53,312	31,562	12,171	97,045
	2010	65	55,000	33,784	12,171	101,000
	2015	67	56,700	36,162	12,171	105,000
	2025	70	59,200	41,433	12,171	112,800
Caledonia County State	Lyndonville					
	2005	19	2,050			2,050
	2010	20	2,200			2,200
	2015	21	2,300			2,300
	2025	23	2,500			2,500
Edward F. Knapp State	Barre/Montpelier					
	2005	60	31,000		1,000	32,000
	2010	62	32,000		1,000	33,000
	2015	64	33,100		1,000	34,100
	2025	67	34,600		1,000	35,600
Fair Haven Municipal	Fair Haven					
	2005	2	400			400
	2010	3	600			600
	2015	3	600			600
	2025	3	600			600
Franklin County State	Highgate					
	2005	53	19,900		1,500	21,400
	2010	55	20,700		1,500	22,200
	2015	58	21,400		1,500	22,900
	2025	62	23,300		1,500	24,800
Hartness State	Springfield					
	2005	37	9,200		100	9,300
	2010	39	9,700		100	9,800
	2015	40	9,900		100	10,000
	2025	42	10,400		100	10,500
John H. Boylan State	Island Pond					
	2005	1	200			200
	2010	2	400			400
	2015	2	400			400
	2025	2	400			400

Table 4-26
Projections of Total Operations at Vermont's Public Use Airports, Continued

Airport Name	City	Based Aircraft	GA Operations	Commercial Operations	Military Operations	Total Operations
	Year					
Middlebury State	Middlebury					
	2005	50	31,450		800	32,250
	2010	52	32,700		800	33,500
	2015	54	34,000		800	34,800
	2025	58	36,500		800	37,300
Morrisville-Stowe State	Morrisville					
	2005	28	17,520		500	18,020
	2010	29	18,100		500	18,600
	2015	30	18,800		500	19,300
	2025	32	20,000		500	20,500
Mount Snow	West Dover					
	2005	7	6,600			6,600
	2010	8	7,500			7,500
	2015	8	7,500			7,500
	2025	9	8,500			8,500
Newport State	Newport					
	2005	17	6,960		180	7,140
	2010	18	7,400		180	7,600
	2015	19	7,800		180	8,000
	2025	20	8,200		180	8,400
Post Mills	Post Mills					
	2005	29	9,510			9,510
	2010	31	10,200			10,200
	2015	32	10,500			10,500
	2025	34	11,100			11,100
Rutland State	Rutland					
	2005	41	26,936	6,082	832	33,850
	2010	43	28,200	9,440	832	38,500
	2015	44	28,900	13,300	832	43,000
	2025	46	30,200	13,300	832	44,300
Shelburne	Shelburne					
	2005	56	3,000			3,000
	2010	58	3,100			3,100
	2015	59	3,200			3,200
	2025	62	3,300			3,300
Warren-Sugarbush	Warren					
	2005	70	22,500			22,500
	2010	73	23,500			23,500
	2015	76	24,400			24,400
	2025	82	26,400			26,400

Table 4-26
Projections of Total Operations at Vermont's Public Use Airports, Continued

Airport Name	City	Based Aircraft	GA Operations	Commercial Operations	Military Operations	Total Operations
	Year					
William H. Morse	Bennington					
	2005	50	26,400		120	26,520
	2010	52	27,500		120	27,600
	2015	53	28,000		120	28,100
	2025	56	29,600		120	29,700

Source: FAA 5010 Airport Master Record, Wilbur Smith Associates

Chapter Five:
Facility and Service Objectives

INTRODUCTION

Once system airports are grouped into existing roles or functional levels, the next step in the process to evaluate the Vermont Airport System is to identify facilities and services that should ideally be available at airports in the four role classifications. It is important to note that facility and service objectives delineated in this chapter are just that, objectives based on the airport's existing role as identified in this analysis. It is possible that airports that have been categorized in the analysis of existing airport roles or are recommended for an increase in their classification in later analyses may, for a variety reasons, be unable to comply with certain facility and service objectives. An airport's inability to meet the facility and service objectives for its role does not necessarily preclude that airport from performing that role or function within the system, but will be considered in the analysis of options to meet identified system deficiencies. It is also important to note that the objectives presented are minimums, and that airports with facilities in excess of the objectives will be considered to meet the objective. A reduction or removal of facilities is not planned as part of this analysis. **Table 5-1** presents a review of the four airport roles and their associated airports as identified in Chapter Three.

Table 5-1
Vermont Airport System Functional Roles

Functional Role	Airport Name	City
National Service	Burlington International	Burlington
	Edward F. Knapp State	Barre/Montpelier
	Rutland State	Rutland
Regional Service	Hartness State	Springfield
	Morrisville-Stowe State	Morrisville
	William H. Morse State	Bennington
Local Service	Caledonia County State	Lyndonville
	Franklin County State	Highgate
	Middlebury State	Middlebury
	Newport State	Newport
Specialty Service	Basin Harbor	Vergennes
	Fair Haven	Fair Haven
	John H. Boylan State	Island Pond
	Mount Snow	West Dover
	Post Mills	Post Mills
	Shelburne	Shelburne
	Warren-Sugarbush	Warren

Source: Wilbur Smith Associates

It is also important to note that the purpose of the System Plan is to provide guidance to VTrans on the airport needs of the State. These statewide needs, including facilities and services identified in this analysis, may differ from airport-specific studies. Airport-specific studies consider conditions in the community and the analyses are more detailed than what is conducted at a system level. From an FAA funding standpoint, projects must be included and justified in airport-specific studies in order to be eligible for FAA participation. Projects must be identified in an airport layout plan and appropriate environmental analyses must be prepared prior to consideration for funding. While a system plan's analysis is considered in the overall context of FAA review, justification for airport-specific projects must be provided to gain FAA approval.

Before identifying the recommended facility and service objectives for airports in each of the four roles, a brief discussion is included summarizing the idealistic characteristics of an airport in each of the four roles in regard to the following:

- Function
- Activity
- Facilities/Services
- Runway Length

NATIONAL SERVICE AIRPORTS

FUNCTION

National Service airports provide Vermont's primary intrastate, interstate, and international connections for commercial passenger and cargo service. They accommodate scheduled service from air carriers and have large geographic service areas. Additionally, FAA-designated reliever airports and airports accommodating Part 139 operators are also included in this functional role. Reliever airports and airports with Part 139 operators help to facilitate corporate and commercial aviation travel in metropolitan areas of the State. Publicly owned National Service airports should be included in the FAA's National Plan of Integrated Airports Systems (NPIAS).

ACTIVITY

At National Service airports, air carriers should provide commercial passenger and cargo service. These airports also serve larger general aviation aircraft including business jets. Service areas for these airports include Vermont's largest population centers and generally have surface travel times of 45 minutes. National Service airports could even accommodate substantial business and military aviation activity, including operations by large aircraft.

FACILITIES/SERVICES

Services provided at National Service airports should include jet fuel, AvGas, and aircraft maintenance. Full service pilot/passenger facilities should also be available. Airside (airfield, all weather capabilities, lighting, navigational aids, and air traffic control) and landside (passenger, cargo, and auto parking) facilities and passenger services are required to accommodate the needs of air carriers and significant corporate users.

RUNWAY LENGTH

The minimum primary runway length identified for the National Service airports is 5,500 feet, with a minimum width of 100 feet. This length corresponds to a Federal Aviation Administration (FAA) airport reference code (ARC) of at least C-II. Definitions of the FAA's ARC system are provided in a subsequent section of this chapter, but the ARC refers to the largest aircraft that regularly operates at an airport for which the airport should be designed to accommodate. Commercial service aircraft, some of which have a higher ARC, may require additional runway length based upon specific activity at an airport. General aviation aircraft that are in the C-II category include:

- Gulfstream IV
- Canadair RJ 200
- Gates Learjet 25
- Rockwell Sabre 75

Regional Service Airports

Function

Regional Service airports accommodate a wide range of general aviation users for larger service areas outside major metropolitan areas of Vermont. They provide access to the air transportation system for communities that have surface travel times of 45 minutes to the next Regional or National Service airport. Regional Service airports also accommodate seasonal general aviation activities where appropriate. Regional Service airports that are publicly owned should be included in the NPIAS.

Activity

Regional Service airports primarily accommodate general aviation users, and may also include military and medi-vac flights within large service areas. These airports may have locally-based business jets or turboprops and/or substantial amounts of itinerant turbine aircraft activity. Several may also provide air cargo service by smaller aircraft. Aircraft weighing more than 12,500 pounds are considered to be the most common critical aircraft that operate at these airports.

Facilities/Services

Services such as jet fuel and AvGas, aircraft maintenance, and pilot/passenger facilities should be available at Regional Service airports. A full range of airside (airfield, lighting, all weather capabilities, and navigational aids) and landside (business/general aviation terminal, auto parking, and corporate hangars) facilities and passenger services capable of accommodating the needs of business aviation and general aviation users should also be provided.

Runway Length

In an effort to attract and maintain small to medium body business jet activity in the State of Vermont, the primary runway length needed for a Regional Service airport is a minimum of 5,000 feet, with a minimum width of 75 feet.

A runway length of 5,000 feet allows for business jet operations under many conditions, with many business jets in the B-II category. The following is a list of ARC B-II aircraft:

- Citation II
- Cessna 441
- Hawker 400
- Shorts 330

Local Service Airports

Function

Local Service airports serve the needs of general aviation users and limited business activities within the local area. Local Service airports should have the airfield facilities, navigational aids, lighting, and services necessary to accommodate smaller general aviation users. Publicly owned Local Service general aviation airports should be included in the NPIAS.

Activity

Local Service airports should serve locally-based businesses and general aviation users in addition to aircraft visiting the local area. These airports are to be designed to accommodate light single and multi-engine aircraft weighing 12,500 pounds or less but may still accommodate some limited jet traffic.

Facilities/Services

Traditional services such as AvGas, limited aircraft maintenance, and limited pilot/passenger facilities should be provided at Local Service airports. Airfield facilities, lighting, and services capable of accommodating general aviation users should be provided, along with runway-taxiway systems, lighting, and navigational aids to accommodate traditional general aviation activities.

Runway Length

The ideal primary runway length and width for the Local Service airport is 4,000 feet by 60 feet, respectively. This runway length corresponds to the FAA ARC of B-I. The following list includes examples of propeller driven aircraft with an ARC of B-I which may operate at these airports:

- Beechcraft King Air B100
- Cessna 421
- Embraer 121

Specialty Service Airports

Function

Specialty Service airports will only be able to accommodate limited types of general aviation use, including emergency and recreational use in smaller communities and remote areas of Vermont. These airports have basic facilities and are designed to support specific specialty functions. Activity levels at these airports will probably be the lowest in the system and more than likely will not be included in the FAA's NPIAS.

Activity

Specialty Service airports are located in communities and remote outlying areas with small population numbers within their service area. They may have hard surfaced or unpaved runways (gravel, dirt, or turf). Some of the runways may have lighting. Most of these airports operate under visual flight rules (VFR) providing no instrumentation or guidance to the airport.

Specialty Service airports provide an important emergency function due to their location. Many of these airports can provide access to unique recreational attractions in Vermont. Airports in this category typically accommodate recreational activity such as single-engine piston aircraft, sport/experimental aircraft, gliders, and balloons.

Facilities/Services

Services such as AvGas and aircraft maintenance will likely be very limited at Specialty Service airports. These airports only operate under VFR and have a runway-taxiway system capable of accommodating limited types of general aviation activity.

Runway Length

The recommended primary runway length and width for Specialty Service airports is 3,000 feet and having a width of 60 feet with a corresponding ARC of A-I. The following list of aircraft represents single-engine piston and recreational/experimental aircraft with an ARC of A-I:

- Cessna 177
- Beechcraft Baron B55
- Beechcraft Bonanza

Airport Capital Facility Program (2000)

The Vermont Airport Capital Facility Program (VACFP) was completed in 2000 as a follow-up to the 1998 Vermont Airport System Policy Plan. The VACFP was undertaken to determine the ten-year capital facility needs for the ten State-owned airports, in addition to two municipally-owned airports. The VACFP classified airports and prioritized recommended projects through a ranking system. A financial plan was also developed for the proposed improvements. Through the process, a set of appropriate development standards was identified for airports in each classification.

As part of this System Plan's process, it was determined by VTrans and the consultant that the 2000 VACFP would serve as a basis for consideration for this plan's facility and service objectives, with modifications to develop a system-wide approach. In this effort, the processes involved and the results of the VACFP were compared to facility and service objectives developed for this current plan, including the process used to derive the specific objectives. In some instances, this System Plan's minimum facility and service objectives correspond to that of recommendations made in the VACFP. The purpose of this review was to insure that recommendations from this System Plan were in relative focus with goals established during the VACFP.

It is important to note that the process and purposes of these two studies differ greatly. The VACFP looked at individual airports and used detailed analyses to determine what recommended improvements were required based on each airport's specific needs. This is similar to a master plan level of effort. The current System Plan, however, is analyzing the entire system of airports and how these airports fulfill roles to allow the system to efficiently function. The System Plan includes recommendations for airports grouped into roles that serve a similar function in the over State system. In this sense, the analysis put forth for this System Plan is structured to set up minimum facility and service objectives for those airports in each role category to strive to meet in order to serve the demand and needs of its users. As mentioned earlier, it should be understood that not all airports may be able to meet the recommendations identified in this analysis. In addition, some airports may have facilities and services that presently exceed the minimum objectives.

Facility and Service Objectives

As previously noted, in order for airports to fulfill their roles in the system, certain facility and service objectives should be met. The following section provides a detailed explanation of the facilities and services that are recommended objectives for each of the role categories depicted in **Table 5-2** (depicted at the conclusion of the descriptions of the facilities and services). In the case where an objective is quantifiable, an explanation is given as to how the specified number is to be calculated. These facility and services include:

- ARC
- Runway (Length, Width, Strength)
- Taxiway
- Navigational Aids
- Approach Aids
- Lighting
- Weather
- Ground Communications
- Covered Storage/Aircraft Apron
- GA Terminal/Admin. Building
- Fencing
- Auto Parking
- Fuel/FBO/Maintenance
- Maintenance
- Ground Transportation
- Other

ARC

The FAA Advisory Circular 150/5300-13, Airport Design-Change 9, defines the ARC as, "a coding system used to relate airport design criteria to the operational and physical characteristics of the airplanes intended to operate at the airport." The most demanding aircraft that operates at an airport on a regular basis with at least 500 takeoffs and landings a year determines each airport's individual design standards and is known as the design or critical aircraft.

An airport's design standard is typically established during the development of an airport-specific master plan or airport layout plan (ALP). Each airport's design standards are related to the approach speed and the wingspan of its design aircraft. These two parameters are used to determine each airport's ARC; a letter, A, B, C, D, or E, is defined by the approach speed of the design aircraft, while a Roman numeral, I, II, III, IV, or V, is identified based on the wingspan of the design aircraft. Each airport in the FAA's National Plan of Integrated Airport Systems is encouraged by the FAA to meet all applicable design and development standards for their critical aircraft's ARC.

Runway

A recommended length, width and strength are stated in Table 5-2 for the primary runway at each airport in the four service roles. These parameters reflect the minimum requirements of the designated ARC for each service role. The existing length and width of each airport's runways were referenced in Chapter Two in addition to a description of its strength.

Taxiway

The presence of a specific taxiway for each primary runway is noted for the airports in each of the four roles. A full-length parallel is a taxiway that spans the entire length of the primary runway. A partial-parallel taxiway spans only part of the length of its associated runway. Runways without a taxiway system may have areas at one or both ends of the runway for aircraft to reverse direction and perform other operations off the runway. These are called turnarounds.

Navigational Aids (NAVAIDs)

NAVAIDs are electronic or visual devices that provide guidance to pilots during the landing or takeoff of an aircraft. Depending on the type of devices that are provided, a more precise approach may be provided to the airport for use during inclement weather or poor visibility. Chapter Two presented an inventory of the existing NAVAIDs in place at Vermont's system airports. These included an explanation of the components of an instrument landing system (ILS), approach lighting system (ALS), and the various types of runway lighting.

Approach

Precision approaches provide electronic horizontal and vertical information to aircraft during the approach to and landing at an airport. These systems allow aircraft to locate an airport and land on a specific runway during periods of reduced visibility and/or inclement weather. Precision approaches require an instrument landing system (ILS), which includes a localizer and a glide slope indicator. Similar to precision approaches, non-precision approaches provide electronic information to aircraft during their approach to and landing at an airport. In general, these systems only provide horizontal guidance with relation to a specific runway at an airport. These systems do not provide vertical guidance or glide slope information to an aircraft. Non-precision approaches are named after the NAVAID used for the approach. This could be an NDB, VOR, LOC, RNAV, or GPS. Some approaches may also require a DME or availability of airport radar. Definitions of these approach types are included in a glossary of terms included with the System Plan. Airports without any type of NAVAID/approach aids are considered to have a visual approach.

The FAA publishes approved instrument approaches for U.S. airports. Aircraft performing instrument approaches must conform to these published procedures. Published approaches include a ceiling minimum and visibility minimum. The ceiling minimum is the altitude that an aircraft may not descend below above mean sea level unless the approach-end of the runway is visually in sight, and a safe and normal landing can be completed. The visibility minimum is the line of sight distance required at an airport for a pilot to be able to complete an operation at an airport. If meteorological conditions restrict the line of sight to a distance below the specified minimum at an airport, a pilot is not allowed to complete an approach or take-off.

Lighting

Airports included in the Vermont Airport System Plan are recommended to have either medium intensity runway lighting (MIRL) or high intensity runway lighting (HIRL), depending on the role they fufill in the system. Medium intensity taxiway lighting (MITL) or high intensity taxiway lighting (HITL) are also recommended based on service roles.

Weather

There are a number of different methods for gathering and recording weather for aviation purposes. It is recommended that airports in Vermont use one of two automated systems for generating airport weather reports. The Automated Surface Observing System (ASOS) is a weather observation and recording system maintained by the National Weather Service. ASOS reports wind, visibility, cloud height, temperature, dew point, pressure, and precipitation. In addition to ASOS stations, another type of weather reporting is through an Automated Weather Observing System (AWOS). The most advanced version, an AWOS-3, reports wind, visibility, cloud height, temperature, dew point, and pressure.

It is desirable that all system airports provide access to the Pilot Weather Briefing System (PWBS). State-owned airports in Vermont currently use the WSI Pilotbrief Dispatch. This tool cost effectively delivers operational data including weather, and flight tracking throughout the dispatch organization. Worldwide AVN GRIB, text weather and NOTAM data can be directly exported into a flight planning system to provide accurate information necessary for safely planning comfortable and economic flights.

Ground Communications

The availability of ground communications indicates whether it is possible to contact air traffic control (ATC) via radio while on the ground at the airport. It is recommended for Vermont airports to have this capability through either a ground communications outlet (GCO), or a remote communications outlet (RCO). Such a capability allows pilots to obtain clearances directly from ATC, instead of having to obtain a clearance void time, which is much less efficient. This capability is becoming less important as cell phone coverage expands.

Covered Storage/Apron

Covered aircraft storage is typically provided by either t-hangars or conventional hangars. T-hangar units provide individual aircraft storage areas suitable for storing most single-engine aircraft, and smaller twin-engine aircraft. Conventional hangars are free-standing, covered buildings used to store one or more aircraft. A recommendation is made for each role category as to the amount of storage space an airport should be able to provide for a specified percentage of its based aircraft.

The aircraft apron area is the paved strip usually located in front of and around airport hangars and terminal buildings. The apron is where paved tie-down spaces are located. Tie-down spaces are individual, outdoor locations where aircraft are tied down and stored. The amount of apron space needed at an airport should relate to the percentage of based aircraft not in covered storage, and daily transient aircraft that may either park short-term or overnight. In order to determine the latter, the forecasted general aviation operations for each airport as determined in Chapter Four are used. The percentage of itinerant operations is calculated from the base data obtained for each airport from the FAA 5010 form, and is assumed to remain constant. The forecasted general aviation operations at each airport are then multiplied by the associated itinerant percentage. This is then divided by 12 (number of months) to determine the number of itinerant operations during an average month. The most active month is assumed to have 15 percent more operations than the average month. From this number, the daily number of itinerant operations in the busiest month is derived by dividing by 30 (number of days in month), which is then increased by 20% to represent the number of peak day operations. As a result of an operation representing either a take-off or a landing, this number is then halved to represent the itinerant aircraft that would be performing a landing. Each role has an associated percentage which represents the number of transient aircraft that may be parked on the apron at any one time during the busiest day.

An airport rule of thumb generally considers that 360 square yards of apron space will accommodate one general aviation single-engine transient aircraft. Based single-engine aircraft generally require less apron space, approximately 300 square yards per aircraft.

Fencing

Security fencing is the most common means of securing an airport's perimeter from outsiders, and from prohibiting wildlife from entering the operations area. Fencing can vary in design, height, and type depending on each airport's security needs.

Fencing an entire airport perimeter may not always be economically feasible or even necessary for some Vermont system airports. Partial fencing of just the airside operations area and storage facilities may be more appropriate for some airports.

Auto Parking

Auto parking needs for general aviation are most often tied to the number of based aircraft. In addition, at busier general aviation facilities, there may be a need to provide parking for employees, visitors, and other on-airport businesses such as rental car providers. Auto parking requirements are calculated by allotting one space for each based aircraft, in addition to spaces allocated for visitors and employees calculated based on a percentage of the based aircraft.

GA Terminal/Administration Building/FBO/Fuel/Maintenance

General aviation terminal/administration buildings are planned to serve the total number of peak hour operations/passengers. General aviation buildings may serve many different roles, depending on the complexity of the airport. At many of the National and Regional service airports, the general aviation terminal/administration building may even house a full-service fixed-base operator (FBO). In other instances, an FBO is located in a separate building on airport property. At smaller airports, a terminal/administrative building may only provide a restroom and a telephone. Dependent upon the role of each airport, a minimum amount of square footage for the terminal/administrative building has been recommended.

A Fixed-Based Operator often provides services such as fuel, hangar and tiedown rental, flight school, oxygen, courtesy cars, and aircraft maintenance/repair, dependent upon the size and level of activity at an airport. An FBO that provides all of the above services mentioned are typically considered “full service”. FBOs that may only provide a pilot lounge, restrooms and a phone are considered to be “limited service”.

FBOs typically are responsible for providing fuel service at an airport. The types of aviation fuel that may be available to pilots include jet fuel (Jet A), 100 octane low-lead fuel (Avgas), and motor vehicle fuel (MoGas) used for aviation purposes.

Maintenance and repair services at an airport are also typically provided through the FBO. In some cases, a third party or other on-airport business may also provide aircraft maintenance. Recommendations for aircraft maintenance for Vermont system airports include limited service and full service. Limited service includes typical measures taken for preventive maintenance. Full service maintenance on the other hand, may involve the inspection, overhaul, repair, preservation, and replacement of parts. A full service provider may offer alterations or repairs to the wings, tail surfaces, fuselage, engine mounts, control system, landing gear, and hull.

Ground Transportation

Airports should have available, depending on their role, means of transportation by ground for transient users. An on-site rental car service is one method, but may not always be ideal or cost-efficient. In some cases, the rental car company may not be based on the airport, but should make arrangements to bring a car to the airport or pick up the renter at the airport.

Another option to offer ground transportation to transient users is through a courtesy car/loaner car. This means that a car is made available, free of charge, to transient pilots while they are at the airport.

Table 5-2
Minimum Facility/Service Objectives

National Service	
ARC:	C-II
Runway Length:	Minimum of 5,500 Ft. for primary
Runway Width:	100 Ft. for primary
Runway Strength:	Minimum 60,000 lbs. for primary
Taxiway:	Full Parallel for primary runway
Approach	Published Precision Approach with Ceiling Minimums of 200 feet or Less and Visibility Minimums of ½ Mile or Less
NAVAIDs:	ILS, ALS, REILs, Rotating Beacon, Lighted Wind Indicator/ Segmented Circle,
Lighting:	HIRL, MITL
Weather:	ASOS/AWOS and a PWBS
Ground Communications:	Public Phone, GCO or RCO
Covered Storage:	70% of Based Aircraft
Aircraft Apron:	30% of Based Aircraft Plus an Additional 75% for Transient Users
GA Terminal/Administration Building:	2,500 Sq. Ft.
Fencing:	Entire Airport
Auto Parking:	1 Space for Each Based Aircraft Plus 50 % for Employees/Visitors
Fuel:	Self-Service AvGas & Jet A
FBO:	Full Service
Maintenance:	Full Service
Ground Transportation:	Rental Car Available
Other:	Building for Airport Maintenance Equipment
Regional Service	
ARC:	B-II
Runway Length:	Minimum of 5,000 Ft. for primary
Runway Width:	75 Ft. for primary
Runway Strength:	Minimum 30,000 lbs. for primary
Taxiway:	Full Parallel for primary runway
Approach:	Published Non-Precision Approach with ceiling minimums of 400 feet or less and visibility minimums of 1 mile or less
NAVAIDs:	Rotating Beacon, Lighted Wind Indicator/Segmented Circle, REILs, VGSI, Appropriate Instrument(s) for Non-Precision Approach
Lighting:	MIRL, MITL
Weather:	ASOS/AWOS and a PWBS
Ground Communications:	Public Phone, GCO or RCO
Covered Storage:	70% of Based Aircraft
Aircraft Apron:	30% of Based Aircraft Plus Additional 50% for Transient Users
GA Terminal/Administration Building:	2,500 Sq. Ft.
Fencing:	Entire Airport
Auto Parking:	1 Space for Each Based Aircraft Plus 50 % for Employees/Visitors
Fuel:	Self Service AvGas & Jet A
FBO:	Full Service
Maintenance:	Full Service
Ground Transportation:	Rental Car Available
Other:	Building for Airport Maintenance Equipment

Table 5-2
Minimum Facility/Service Objectives, Continued

Local Service	
ARC:	B-I
Runway Length:	Minimum of 4,000 Ft. for primary
Runway Width:	75 Ft. for primary
Runway Strength:	Minimum 12,500 lbs. for primary
Taxiway:	Partial Parallel, Connectors or Turnaround for primary runway
Approach:	Published Non-Precision Approach with ceiling minimums of 1,000 feet or less and visibility minimums of 3 miles or less
NAVAIDs:	Rotating Beacon, Lighted Wind Indicator/Segmented Circle, VGSI, Appropriate Instrument(s) for Non-Precision Approach
Lighting:	MIRL
Weather:	ASOS/AWOS Desirable, PWBS
Ground Communications:	Public Phone, GCO or RCO as needed
Covered Storage:	60% of Based Aircraft
Aircraft Apron:	40% of Based Aircraft Plus Additional 25% for Transient Users
GA Terminal/Administration Building:	Minimum 1,500 Sq. Ft.
Fencing:	Entire Airport
Auto Parking:	1 Space for Each Based Aircraft Plus 25 % for Employees/Visitors
Fuel:	Self Service AvGas; Jet A as Required
FBO:	Limited Service
Maintenance:	Limited Service
Ground Transportation:	Loaner Car Available, Rental Car Desirable
Other:	Building for Airport Maintenance Equipment
Specialty Service	
ARC:	A-I
Runway Length:	Maintain Existing
Runway Width:	NPIAS – 60 Feet, Non-NPIAS – Maintain Existing
Runway Strength:	Not an Objective
Taxiway:	Partial Parallel Desirable for Paved Runways, Turnaround
Approach:	Visual
NAVAIDs:	Not an Objective
Lighting:	Not an Objective
Weather:	PWBS desirable
Ground Communications:	Public Phone, GCO or RCO as Needed
Covered Storage:	Maintain Existing
Aircraft Apron:	Maintain Existing
GA Terminal/Administration Building:	Maintain Existing
Fencing:	Operations Area at a Minimum; Entire Airport Desirable
Auto Parking:	Maintain Existing
Fuel:	AvGas; Jet A as Required
FBO:	Limited Service
Maintenance:	Not an Objective
Ground Transportation:	Desirable
Other:	Not an Objective

Source: Wilbur Smith Associates

SUMMARY

These four functional role categories and the identified stratification of system airports resulted from an analysis that examined factors that measure each study airport's existing contribution to the overall system. Using the airport role classifications, facility and service objectives were identified based on the types of aircraft that are expected to use the airports based on their role in the Vermont system. The existing roles of the airports are evaluated to determine if these roles are appropriate for the Vermont airport system to meet future needs and how the future system of airports meet identified objectives. This subsequent evaluation shows the adequacies and the deficiencies of the overall airport system, including the need for increased roles for the airports and additional facilities and services. This analysis provides the baseline for developing system recommendations and quantifying future system performance improvements.

Chapter Six:
Current System Performance

INTRODUCTION

Stratification of the airports into functional roles within the Vermont Airport System, identified in Chapter Three, provides a baseline for evaluating the existing airport system. Performance measures, with specific benchmarks for each measure, are used to evaluate the system to determine its current performance. This evaluation provides an indication of where the current airport system is adequate to meet the State's near and long-term aviation needs, identifies specific airport or system deficiencies, and helps to establish surpluses or duplications within the system that can be addressed in the future. This evaluation provides the foundation for subsequent recommendations for the Vermont airport system, as well as for individual study airports.

Some benchmarks used to evaluate Vermont's aviation system are action-oriented, while others are more informational in nature. The three performance measures established to evaluate the system and considered in this chapter include the following:

- **Accessibility –** To provide a system of airports that is accessible from both the ground and the air

- **Development –** To provide an airport system that preserves and enhances existing infrastructure.

- **Safety & Security –** To promote a safe and secure system of airports

The following sections of this chapter use each of the previously established system performance measures and their associated benchmarks to evaluate Vermont's existing airport system. It should be noted that the analyses that are provided are based on conditions as of January 2006.

PERFORMANCE MEASURE: ACCESSIBILITY

For an airport system to adequately serve a state, it should provide convenient and reasonable access from both the ground and the air. The ability of any airport system to meet the Accessibility performance measure can be determined in several ways.

Ground accessibility can be measured by determining the coverage or ability to access provided by system airports to all geographic areas of the State, and by determining the percentages of the State's population that are within established drive times of all or various categories of system airports. System accessibility can also be determined by measuring the effective coverage provided by airports that provide certain types of facilities.

ArcGIS 9, a Geographic Information System (GIS), was used to determine the ground coverage of airports and their proximity to existing and potential users. The task included using these map-based systems to assign driving speeds to various roads and a mathematical process to calculate the distances that can be driven from the airports in a given time period. These calculations result in the development of an FAA standard 30-minute drive time or coverage shape for each airport in the Vermont Airport System Plan. FAA guidelines indicate that, as a general rule, general aviation airports should be located within 30 minutes of their users. When the 30-minute drive times for each airport are calculated and applied to mapping that includes data such as population, the ability of the Vermont's airport system to serve the State and its population can be determined. A 60-minute drive time was used to calculate coverage provided by airports located both in and outside of the State that support commercial air service.

Air accessibility is also an important factor in measuring system performance. Air accessibility is influenced by factors such as the airport's type of approach (precision, non-precision, or visual), and the presence, or lack thereof, of on-site weather-reporting equipment to support the ability of aircraft to land in all weather conditions.

Benchmarks that are used to evaluate the system's ability to provide adequate ground and air access are discussed below.

- Percent of Vermont's population and land area within 60 minutes of an airport with commercial service (Vermont and neighboring airports)
- Percent of Vermont's population and land area within 30 minutes of an airport with a 5,000-foot long runway
- Percent of Vermont's population and land area within 30 minutes of an airport with a 5,000-foot long runway having a precision approach
- Percent of population and land area coverage provided by airports in each of the functional roles

BENCHMARK: PERCENT OF VERMONT'S POPULATION AND LAND AREA WITHIN 60 MINUTES OF AN AIRPORT WITH COMMERCIAL SERVICE (VERMONT AND NEIGHBORING AIRPORTS)

It is important that commercial service airports provide adequate coverage to Vermont's population. GIS analysis depicted in **Exhibit 6-1** shows that 93 percent of Vermont's population is within a 60-minute drive time of an airport that supports commercial service. A majority of this coverage is provided by the only two airports in Vermont that support commercial air service, Burlington International and Rutland State. Out-of-state airports do provide duplicate coverage in many areas of Vermont, but it should be noted that the eastern half of Orange County and the southern half of Caledonia County are exclusively contained within the coverage provided by out-of-state commercial service airports. In addition, the southern tips of Windham and Bennington counties are also exclusively provided coverage by out-of-state commercial service airports, but no Vermont towns of significant population are located within these areas.

It should be noted that only a minimal amount of Vermont's population lies beyond a 60-minute drive time of a commercial service airport. Areas of Vermont that lie beyond the 60-minute drive time coverage include most of Orleans and Essex counties, and the northern half of Caledonia County, all of which are located in northeast Vermont. This area of Vermont is sparsely populated, with only two towns, Newport and Lyndon, having a population greater than 5,000 people. Approximately 75 percent of the State's land area is contained within the 60-minute drive time coverage provided by these airports.

Benchmark: Percent of Vermont's population and land area within 30 minutes of an airport with a 5,000-foot long runway

Adequate runway facilities are one of the most important components of an aviation system. Measuring runway adequacy is more complicated than simply counting the number of airports and/or runways in the system. In many instances, runway adequacy is determined by the ability of individual runways to accommodate use by a specific type of operator or class of aircraft.

A planning "rule of thumb" indicates that corporate jet aircraft typically require 5,000 feet of paved runway length to regularly support their operations at an airport. The 5,000-foot runway length represents a composite runway length requirement that results from a number of different factors being examined, including operational characteristics of specific aircraft, aircraft operator preferences, and standard corporate aircraft insurance policies. **Exhibit 6-2** uses GIS to graphically depict the Vermont system airports with a paved runway measuring at least 5,000 feet in length and their corresponding 30-minute drive time coverage areas. Approximately 62 percent of Vermont's population is within a 30-minute drive time of an airport with a runway length of 5,000 feet or more. The coverage of land provided by these airports is nearly 38 percent, slightly more than one-third of the total land in Vermont.

The service provided by out-of-state airports that meet the 5,000-foot long runway and precision approach standard will be examined in a subsequent chapter.

Benchmark: Percent of Vermont's population and land area within 30 minutes of an airport with a 5,000-foot long runway having a precision approach

Precision approach systems provide electronic longitudinal and glideslope information to aircraft during their approach and landing procedures. These systems allow aircraft to locate an airport and land on a specific runway during periods of poor visibility and/or inclement weather. Operators of the most demanding general aviation aircraft typically prefer to operate at airports with precision approaches. The reliability that these systems provide is important to commercial and business aircraft because it minimizes the periods of time that airports are closed because of poor visibility. Precision approach systems reduce delays related to airport closures, rerouting of aircraft, and ground travel times associated with not being able to access the nearest airport.

The percentage of the State's population and land area within a 30-minute drive time of an airport with a 5,000-foot long runway having a precision approach was measured in this analysis using GIS. **Exhibit 6-3** summarizes the results of the precision approach analysis. As shown in Exhibit 6-3, approximately 21 percent of the State's land area is located within a 30-minute drive time of Burlington International or Edward F. Knapp State, the only two airports that meet these criteria. This provides 44 percent of Vermont's population access to an airport with a 5,000-foot long runway that has a precision approach within a 30-minute drive.

The service provided by out-of-state airports that meet the 5,000-foot long runway and precision approach standard will be examined in a subsequent chapter.

BENCHMARK: PERCENT OF VERMONT'S POPULATION AND LAND AREA WITHIN 30 MINUTES OF AIRPORTS IN EACH ROLE CATEGORY

The FAA generally recommends that system airports be within a 30-minute drive time of their intended users. GIS analysis shows that when all 17 system airports are considered, 95 percent of Vermont's population is within a 30-minute drive time of one, or in some cases more system airports. Physically, the 30-minute drive time coverage provided by all of the system airports is approximately 90 percent of Vermont's land area. The GIS analysis was then conducted for the airports in each of the four roles as defined in Chapter 3, to determine the percentage of the population and land area within a 30-minute drive of the different airport functional roles. Airports in a higher role, such as the National Service category, are considered to meet if not exceed the minimum needs of Regional and Local Service airport users. As a result, population and land coverage provided by a less demanding role will also include the compounded coverage provided by any of the higher roles. It should be noted that although an airport in a higher role may provide the minimum facility and service objectives for an airport in a lower role, certain specialty aviation activities such balloon and glider operations are not always practical or warranted at busier, more demanding airports. For each of the associated graphics that deal with airport roles and ground accessibility, coverage provided by an airport in a higher role will be shown screened behind the coverage of the role that is being exhibited.

The three airports that were stratified as National Service are within a 30-minute drive time of just more than half of Vermont's population, providing coverage to 55.3 percent of the people in the State. This coverage represents approximately 31.9 percent of the land area in Vermont. The airports in this role include Burlington

International, which is located in Vermont's largest metropolitan area. **Exhibit 6-4** depicts the coverage provided by the airports currently classified as National Service.

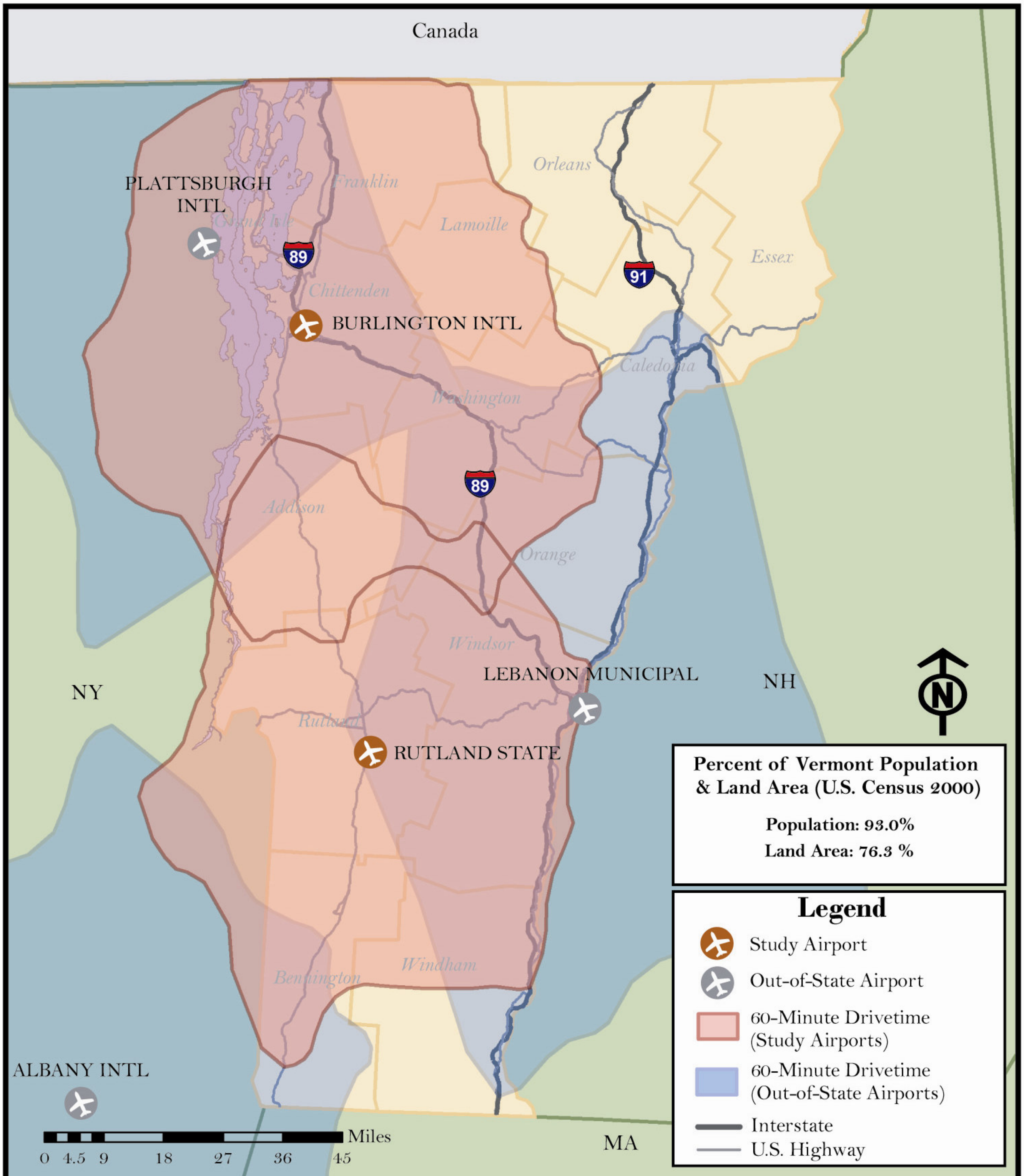
Regional Service airports provide the least amount of coverage in Vermont of the four role categories. **Exhibit 6-5** shows that only 19 percent of Vermont's population lies within a 30-minute drive time of the four Regional Service airports, covering a similar percentage of Vermont's land area at 20.7 percent. Regional Service airports provide some duplicate coverage already provided by National Service airports. When the overall coverage from these two airport roles is combined, approximately 70.5 percent of Vermont's population is within a 30-minute drive time of one of these six airports, providing coverage to almost half of the State's land area.

The four airports in the Local Service role are located within a 30-minute drive time of 26.7 percent of Vermont's population. **Exhibit 6-6** shows that these airports provide most of their coverage along Interstates 89 and 91. The coverage provided by these 30-minute drive times is approximately 30 percent of Vermont's land area. All of the airports in this role except for Middlebury State are located in the northern half of the State. When the coverage provided by these airports is combined with that of the National and Regional Service airports, approximately 88.2 percent of Vermont's population is within a half hour drive by car of a public-use airport. Almost three-fourths of the land mass is located within the overall coverage for these three classifications.

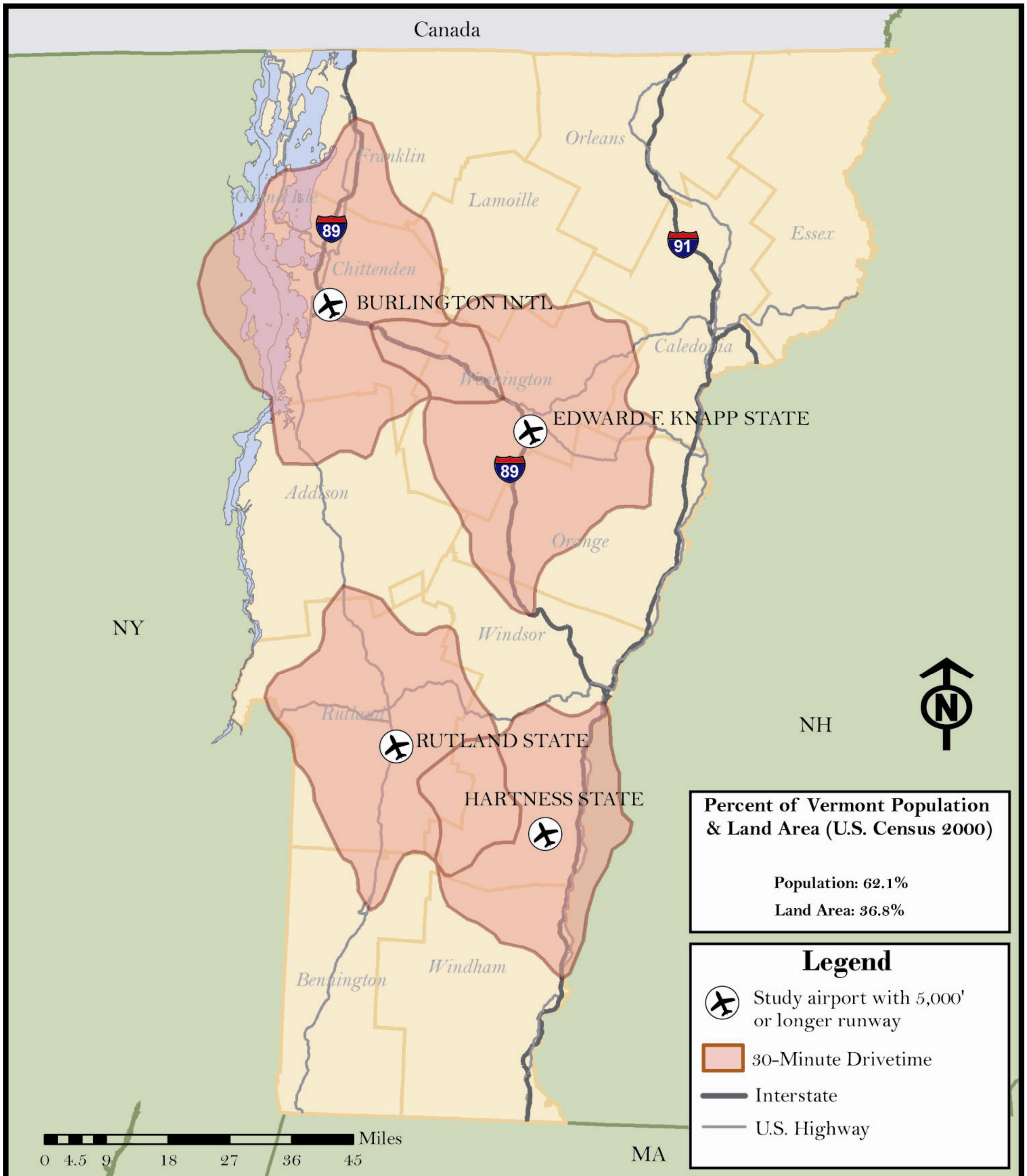
The Specialty Service airports provide the greatest amount of exclusive coverage to both Vermont's population and land area. The 30-minute drive times associated with the seven airports in this role contain 59.5 percent the population and 42.6 percent of the land in Vermont, as depicted in **Exhibit 6-7**. A majority of this coverage is overlapping of airports in the National, Regional, and Local Service roles. Only Post Mills in the east and Mount Snow in the south provide any additional significant coverage not already provided by other airports.

When all coverage provided by the airports in each of the four functional roles is combined, only a small fraction of Vermont's population lies beyond a 30-minute drive time of a public-use airport. **Exhibit 6-8** displays the population of Vermont in a dot-density format with a composite of all 30-minute drive times and significant population centers labeled. As shown, only small areas of low population density are currently not being served by an airport. Most of the gaps in current coverage are along Vermont's borders, primarily in the north and the south. Only one large gap exists in the central region of the State, of which no cities or towns of significant population are located.

The coverage of land and population that has been measured for each of the previously discussed performance measures only reflects that which is provided by Vermont's public-use airports, with the exception of the accessibility to commercial air service. Out-of-state airports may also provide redundant and is some cases additional coverage to Vermont's inhabitants for the various service levels of airports and type of facilities available. However, for the purpose of this section, it is only important to understand how Vermont's airports are currently performing.



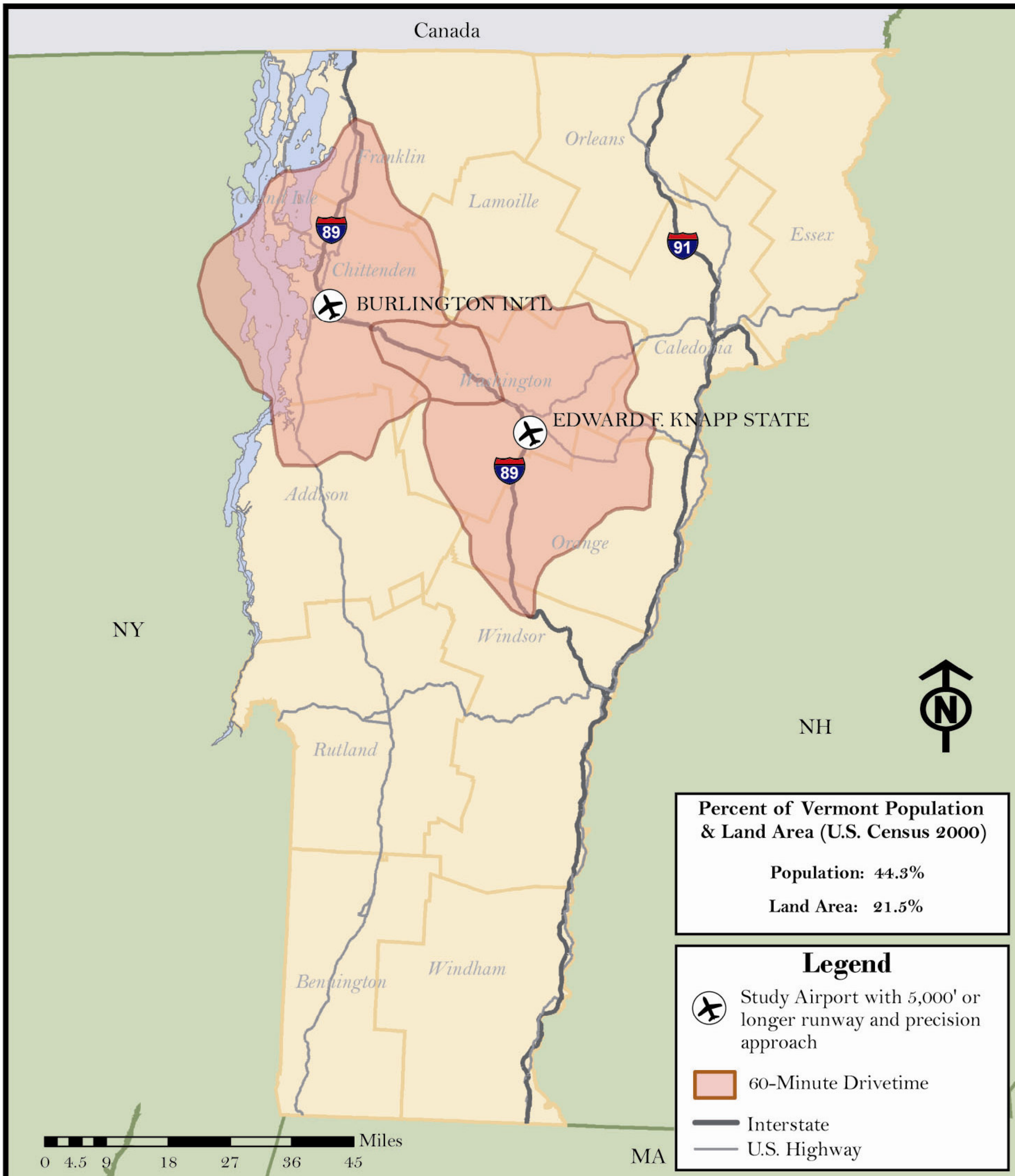
Vermont Airport System Plan Performance Measure: 60-Minute Drive Time of a Public Use Airport with Commercial Service as of January '06	Exhibit 6-1



Vermont Airport System Plan

Performance Measure: 30-Minute Drive Time of a Public Use Airport with a 5,000' Runway as of January '06

Exhibit 6-2



Percent of Vermont Population & Land Area (U.S. Census 2000)

Population: 44.3%

Land Area: 21.5%

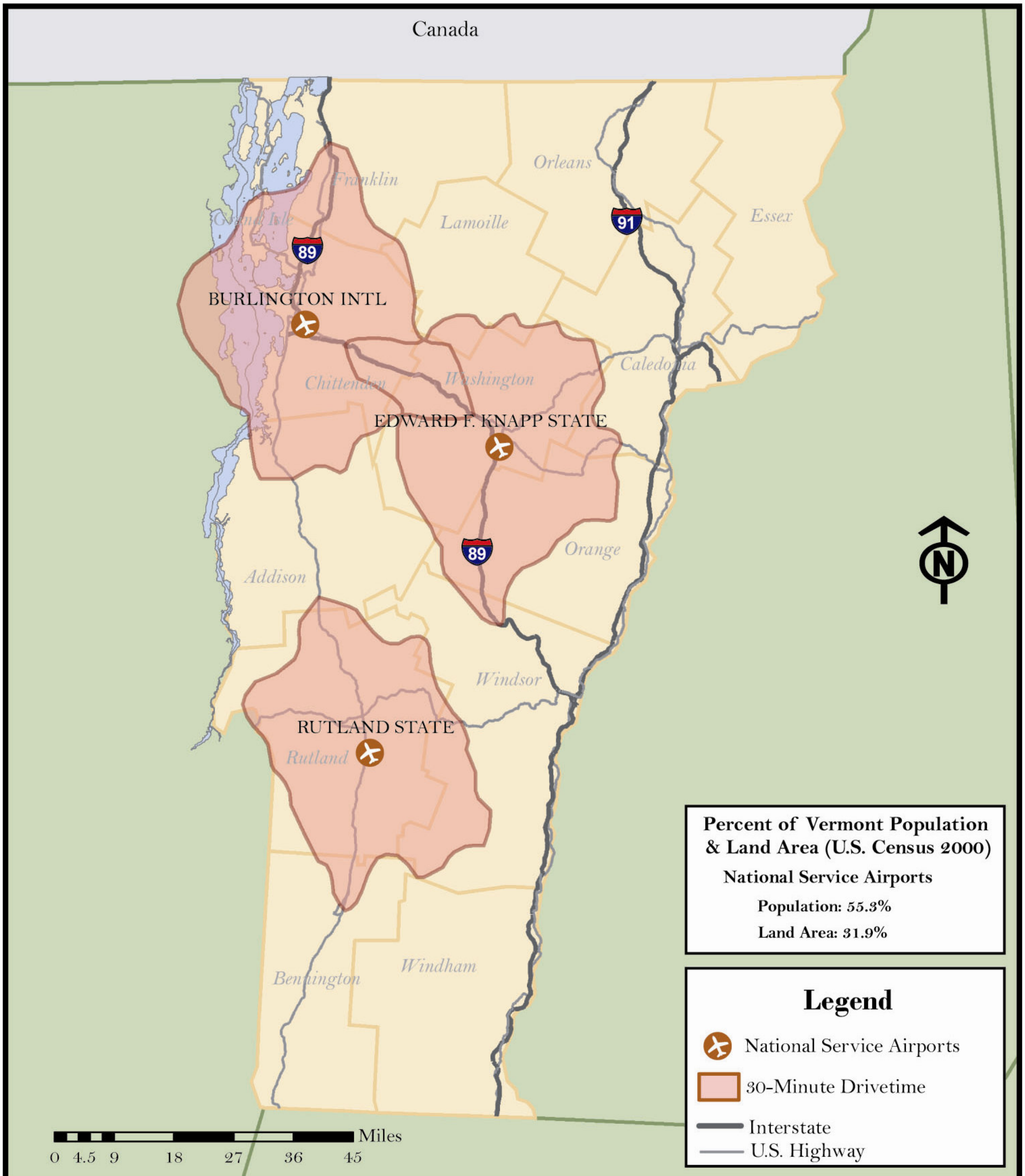
Legend

- Study Airport with 5,000' or longer runway and precision approach
- 60-Minute Drivetime
- Interstate
- U.S. Highway

Vermont Airport System Plan

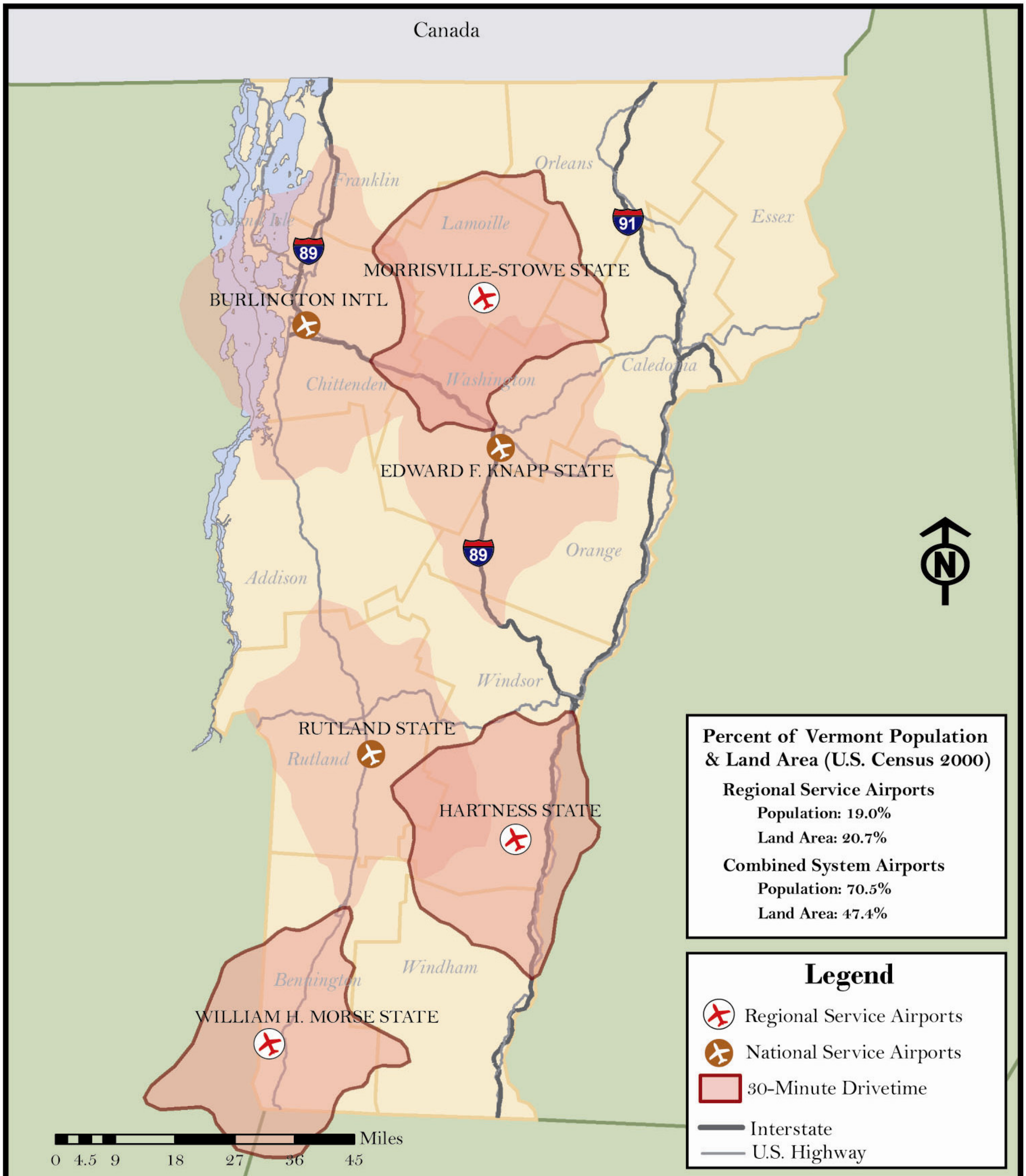
Performance Measure: 30-Minute Drive Time of a Public Use Airport with a 5,000' or Longer Runway with a Precision Approach as of January 2006

Exhibit 6-3



Vermont Airport System Plan
Performance Measure: National Service Airports and 30-Minute Drive Time Coverage as of January '06

Exhibit 6-4



Percent of Vermont Population & Land Area (U.S. Census 2000)

Regional Service Airports
- Population: 19.0%
- Land Area: 20.7%

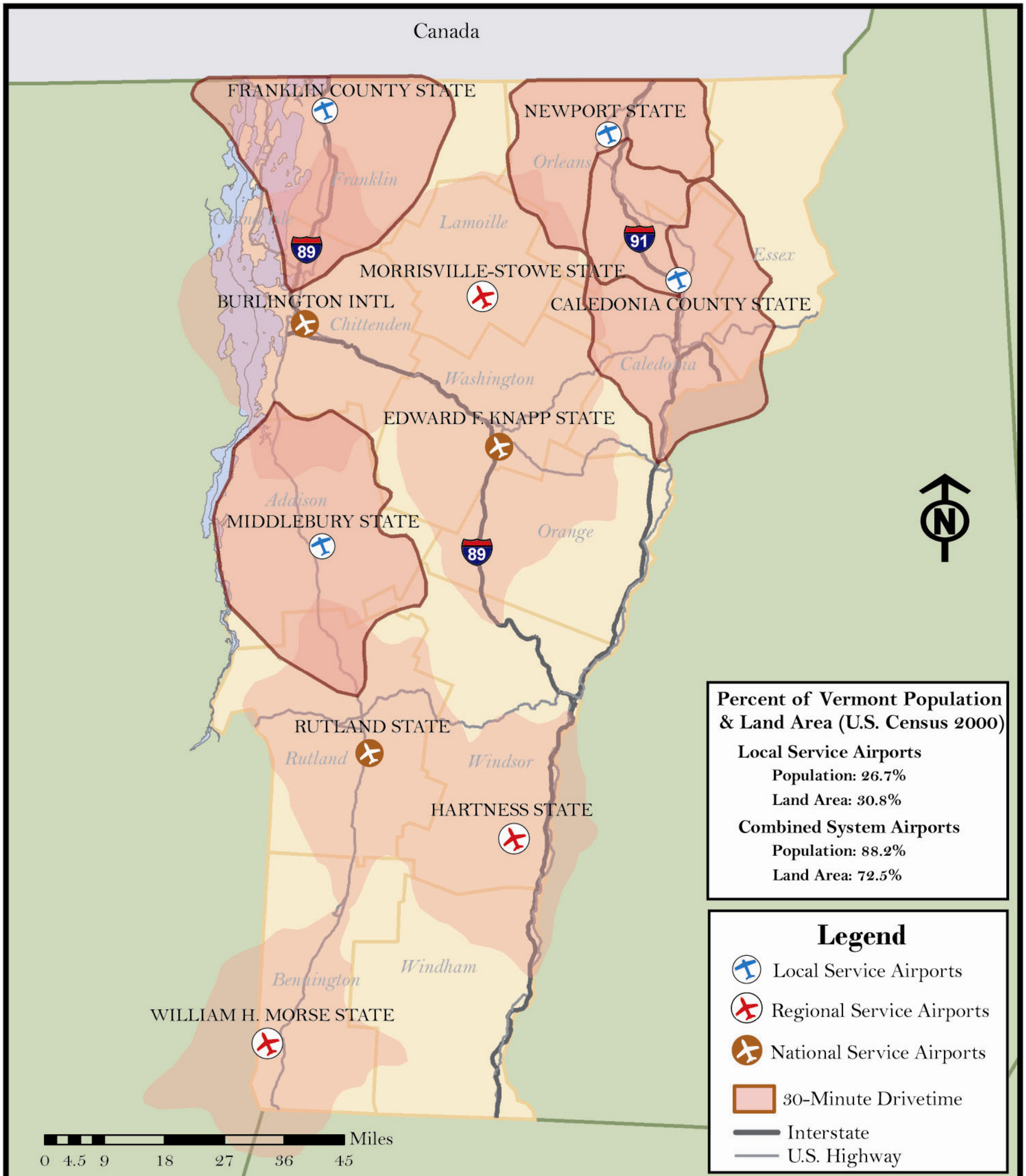
Combined System Airports
- Population: 70.5%
- Land Area: 47.4%

Legend
- Regional Service Airports
- National Service Airports
- 30-Minute Drivetime
- Interstate
- U.S. Highway

Vermont Airport System Plan

Performance Measure: Regional Service Airports and 30-Minute Drive Time Coverage as of January '06

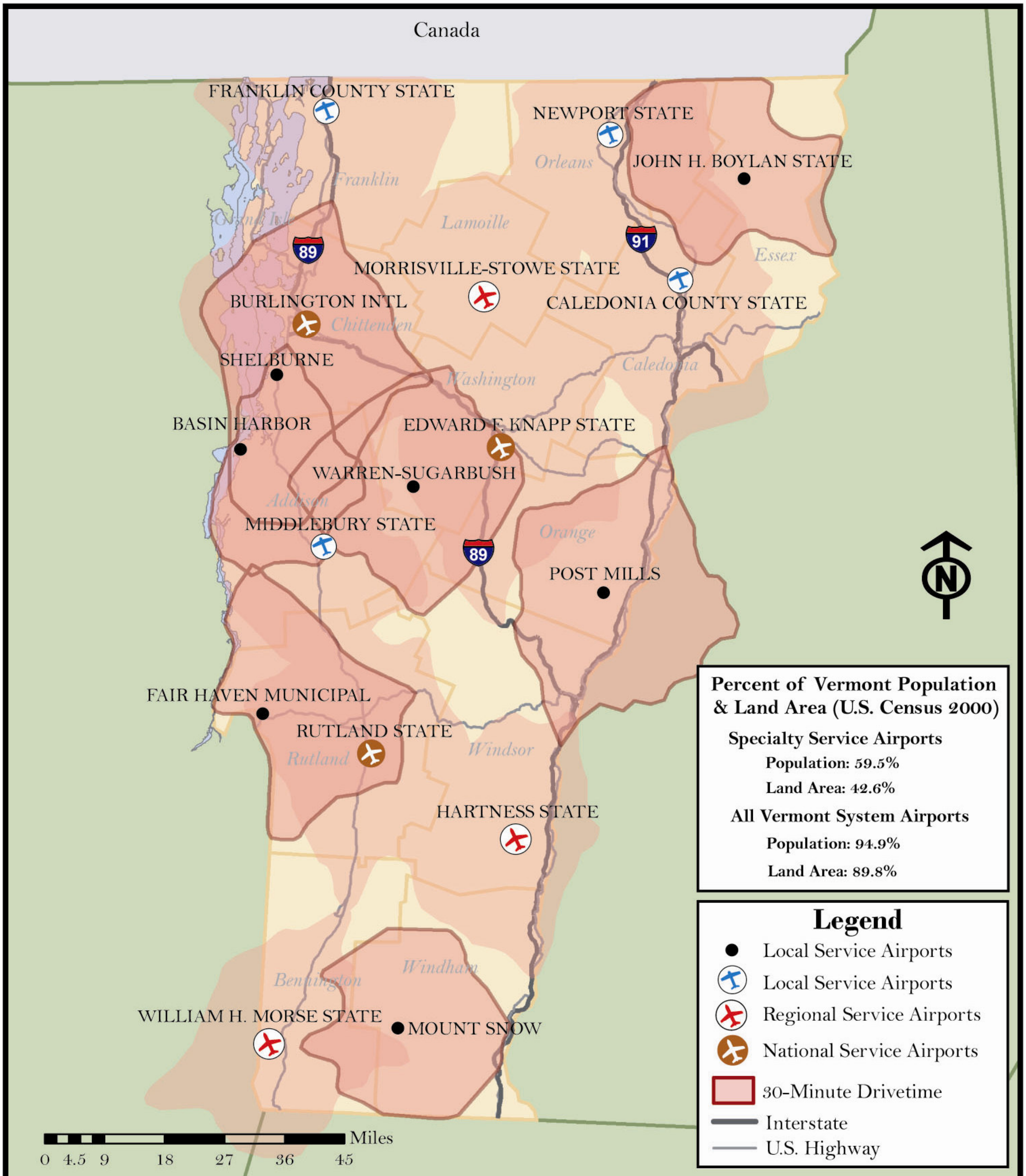
Exhibit 6-5



Vermont Airport System Plan

Performance Measure: Local Service Airports and 30-Minute Drive Time Coverage as of January '06

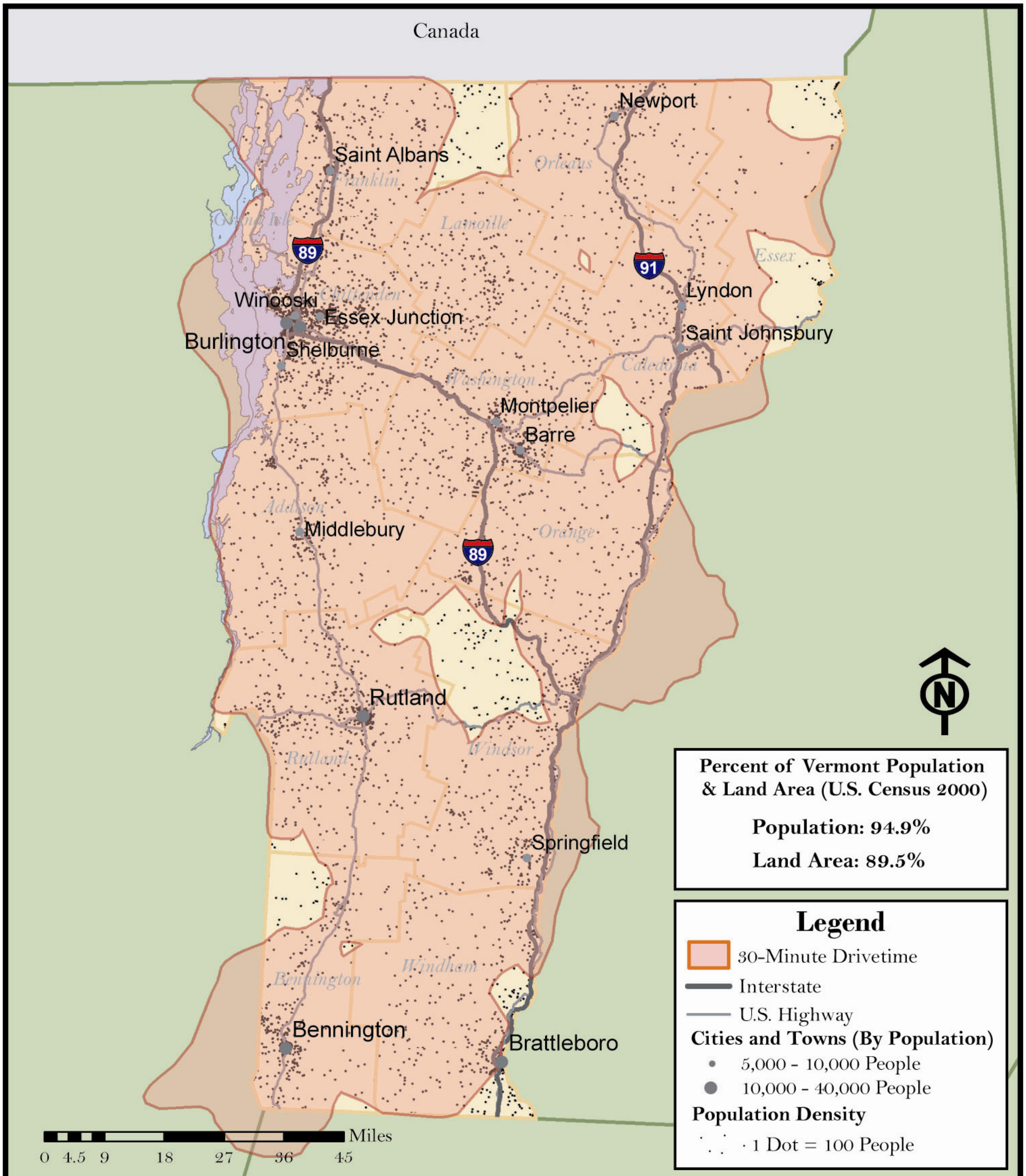
Exhibit 6-6



Vermont Airport System Plan

Performance Measure: Specialty Service Airports and 30-Minute Drive Time Coverage as of January '06

Exhibit 6-7



Vermont Airport System Plan

Performance Measure: Entire Airport System 30-Minute Drive Time Coverage as of January '06

Exhibit 6-8

PERFORMANCE MEASURE: DEVELOPMENT

Development of Vermont's aviation system should seek to preserve and enhance existing airport infrastructure, as appropriate, to maintain the State's access to the national air transportation system. A good airport system should be adequately developed and planned, and provide airside and landside infrastructure and facilities to meet both current and future demand. While landside facilities are typically addressed in an airport master plan, the Vermont Airport System Plan analyzed selected landside facilities to provide a general overview of the system's ability to provide adequate capacity to meet current and future demand.

Specific benchmarks used to evaluate how well the aviation system is meeting the Development performance measure include:

- Percent of population and land area exclusively served (within 30 minutes) by a privately owned airport
- Percent of system airports in each role category meeting minimum facility and service objectives
- Percent of system airports in each role category having a Pavement Condition Index (PCI) of "good" or better
- Percent of system airports in each role category with an Airport Layout Plan (ALP) that has been updated within the last 10 years
- Percent of airports in each category having local airport-related zoning
- Percent of airports in each category that are included in regional land use plans that include airport-compatible land uses in the airport environs

BENCHMARK: PERCENT OF VERMONT'S POPULATION AND LAND AREA EXCLUSIVELY SERVED (WITHIN 30 MINUTES) OF A PRIVATELY OWNED AIRPORT

Privately owned airports are not eligible for FAA Airport Improvement Program (AIP) funds unless they are included in the NPIAS as a designated FAA reliever airport. As a result, improvements and development at many of these airports rests solely with their owner/sponsor but can also be facilitated with the help of State or local funds. In addition, if one or all of these airports were to close or become unusable, significant decreases may occur in overall coverage that is provided by these airports.

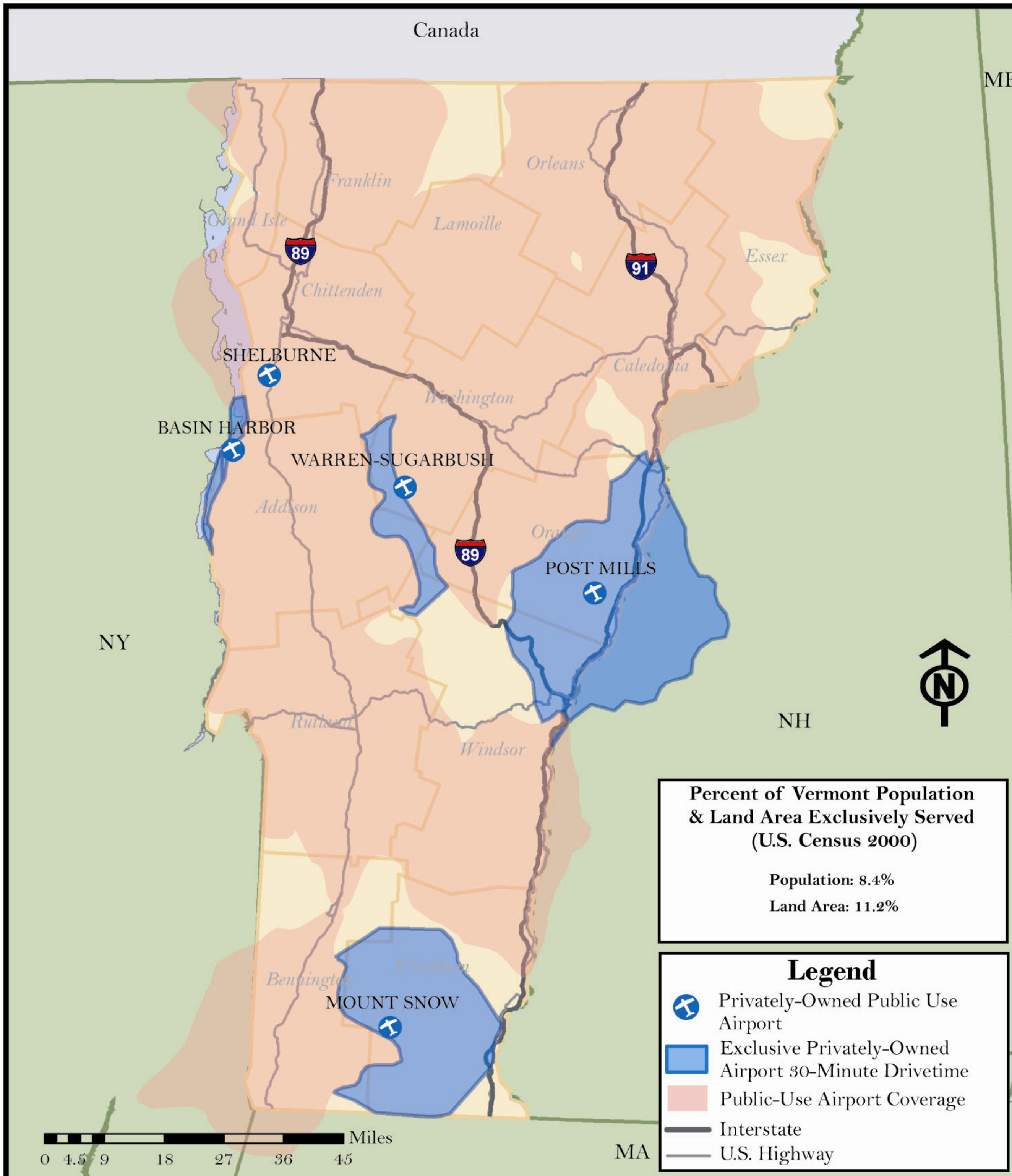
Therefore, it is important to be informed of how many people and how much land in Vermont is exclusively served by privately owned airports.
Vermont has five public-use airports that are privately owned. Most of the coverage provided by these privately owned airports is overlapped by coverage from other State and municipally owned airports. However, approximately 8.4 percent of Vermont's population is exclusively served by the 30-minute drive time coverage provided by these privately owned airports. This same coverage represents approximately 11.2 percent of the land in Vermont. **Exhibit 6-9** depicts the overall 30-minute drive time coverage provided by privately owned airports in addition to highlighting the areas exclusively served by these airports. It should be noted that Post Mills provides the majority of the coverage to the mid-eastern portion of the State, as does Mount Snow in the southern tip of Vermont.

BENCHMARK: PERCENT OF SYSTEM AIRPORTS IN EACH ROLE CATEGORY MEETING MINIMUM FACILITY AND SERVICE OBJECTIVES

As previously noted in Chapter Five, in order for airports to fulfill their roles in the system, certain facility and service objectives should be met. The specific facilities and services needed depend on the role that the airport plays, with more extensive facilities needed at airports that serve larger, more sophisticated aircraft.

It is important to note that the purpose of the System Plan is to provide guidance to VTrans on the airport needs of the State. Facility and service deficiencies identified in this analysis do not necessarily indicate that an airport should or must meet that objective during or beyond the planning period. From an FAA funding standpoint, projects must be included and justified in an airport-specific study in order to be eligible for FAA participation. Projects must be identified in an airport layout plan and appropriate environmental analyses must be prepared prior to consideration for funding. While the System Plan's analysis is considered in the overall context of FAA review, justification for airport-specific projects must be provided to gain FAA approval.

Exhibit 6-10 summarizes compliance within each role category for facility and service objectives as well as the overall system. In the instance where no specific objective has been recommended for a role, the corresponding data has been left blank. A complete, detailed analysis has been performed and is included in **Appendix D**. It should be noted that in some cases none of the airports in a given role may currently meet their recommended objective and it is possible that in the future some may never meet the objective. These facility and services objectives are just that, objectives, and serve as recommendations for the airport system as a whole to strive for when the means for compliance exist.



Vermont Airport System Plan

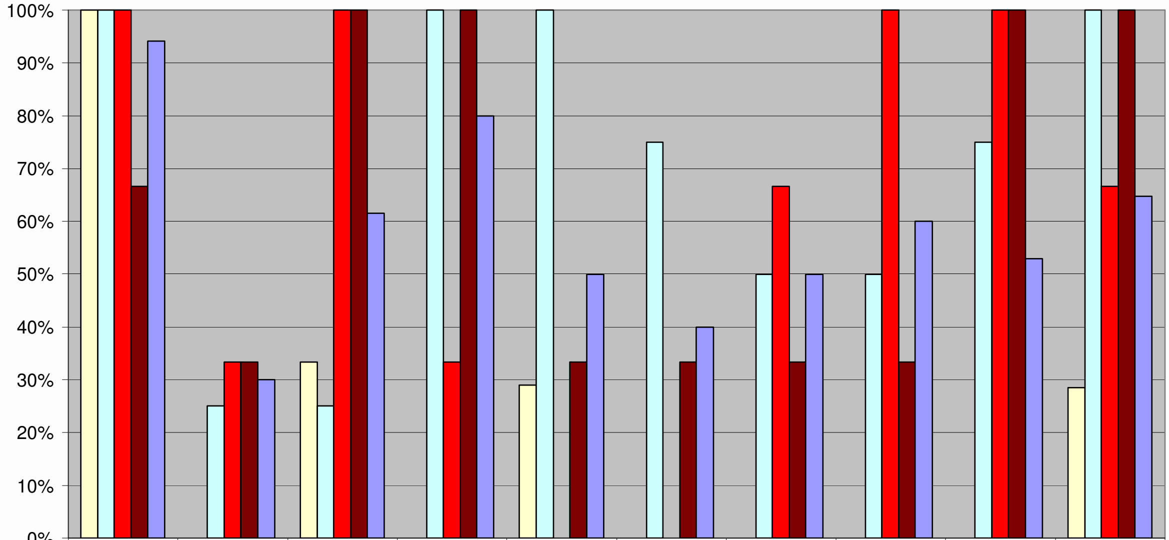
Performance Measure: Privately-Owned Public Use Airports and Exclusive 30-Minute Drive Time Coverage as of January 2'06

Exhibit 6-9

Exhibit 6-10

Performance Measure: Development

Airports Meeting Minimum Facility and Service Objectives

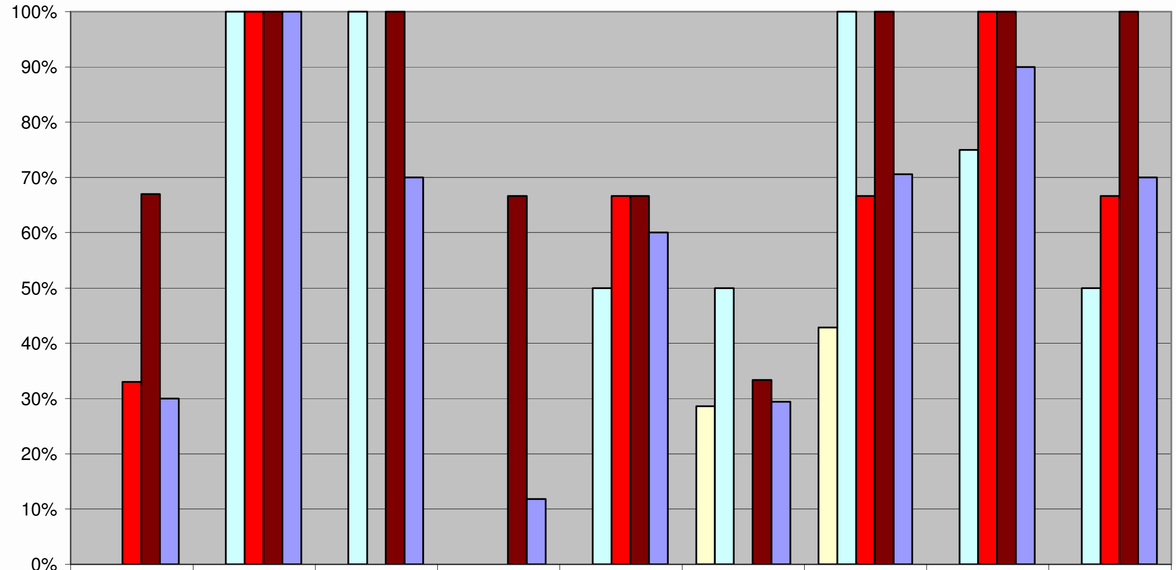


	ARC	Runway Length	Runway Width	Runway Strength	Taxiway	Approach	NAVAIDs	Lighting	Weather	Ground Comm.
Specialty	100%		33%		29%				0%	29%
Local	100%	25%	25%	100%	100%	75%	50%	50%	75%	100%
Regional	100%	33%	100%	33%	0%	0%	67%	100%	100%	67%
National	67%	33%	100%	100%	33%	33%	33%	33%	100%	100%
System	94%	30%	62%	80%	50%	40%	50%	60%	53%	65%

Specialty Local Regional National System

Source: Wilbur Smith Associates

Exhibit 6-10 (continued)
Performance Measure: Development
Airports Meeting Minimum Facility and Service Objectives



	Covered Storage	Aircraft Apron	GA Terminal	Fencing	Auto parking	Fuel	FBO	Maintenance	Ground Trans.
Specialty				0%		29%	43%		
Local	0%	100%	100%	0%	50%	50%	100%	75%	50%
Regional	33%	100%	0%	0%	67%	0%	67%	100%	67%
National	67%	100%	100%	67%	67%	33%	100%	100%	100%
System	30%	100%	70%	12%	60%	29%	71%	90%	70%

Source: Wilbur Smith Associates

BENCHMARK: PERCENT OF SYSTEM AIRPORTS IN EACH ROLE HAVING A PCI OF "GOOD" OR BETTER

Investment in the development and maintenance of paved surfaces at all system airports represents a considerable allocation of funds each year. VTrans has determined that maintaining pavements to a certain standard helps to prevent major, costly reconstruction projects. The review of runway pavement conditions were determined from the FAA 5010 Forms for primary runways only. It should be noted that VTrans completed an Airport Pavement Study in January 2005 that developed PCIs for State-owned airports, as well as a program to manage future pavement projects for State-owned airports.

Most system airports comply with this benchmark as shown in **Table 6-1**.

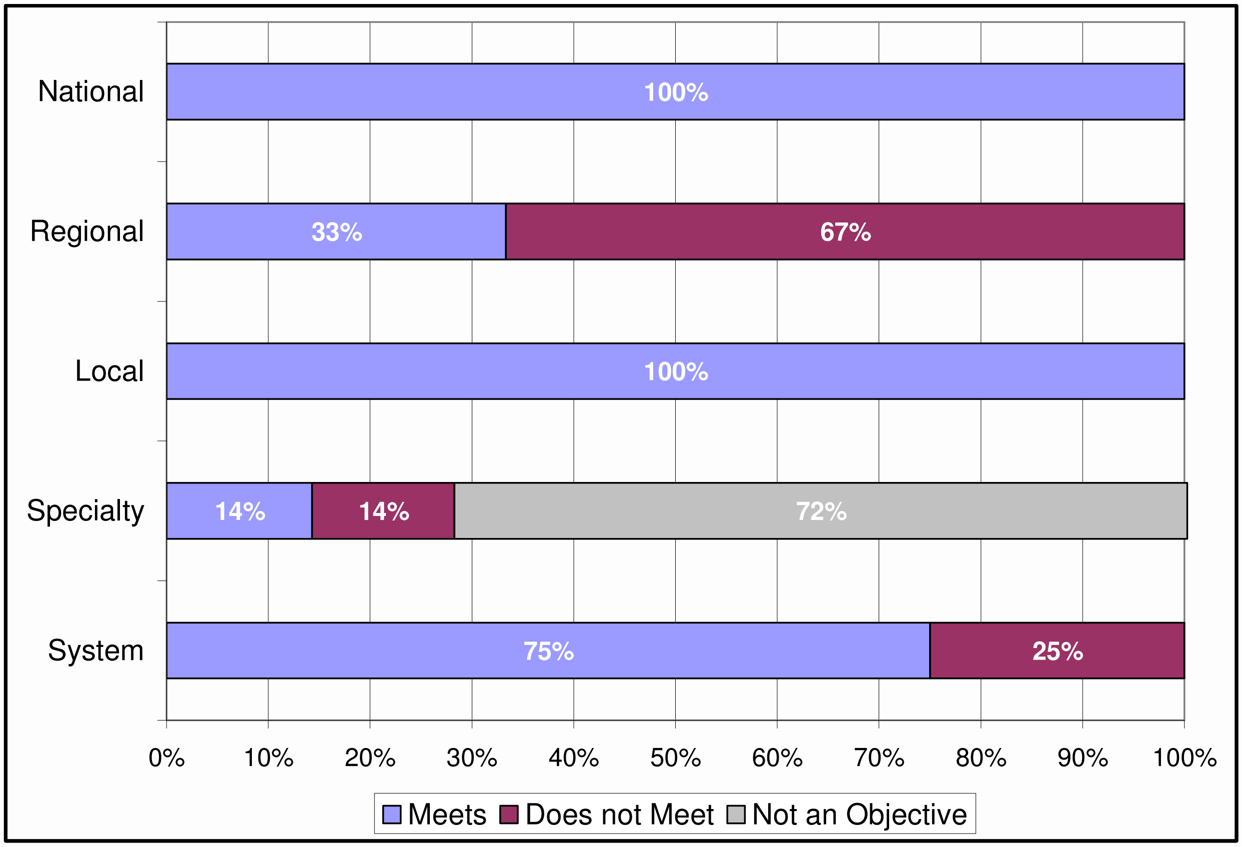
Table 6-1
Performance Measure: Development
Airports Meeting Pavement Condition Objectives

Airport Name	Associated City	Meets	Does Not Meet	N/A*
National Service				
Burlington International	Burlington	X		
Edward F. Knapp State	Barre/Montpelier	X		
Rutland State	Rutland	X		
Regional Service				
Hartness State	Springfield	X		
Morrisville-Stowe State	Morrisville		X	
William H. Morse State	Bennington		X	
Local Service				
Caledonia County State	Lyndonville	X		
Franklin County State	Highgate	X		
Middlebury State	Middlebury	X		
Newport State	Newport	X		
Specialty Service				
Basin Harbor	Vergennes			X
Fair Haven Municipal	Fair Haven			X
John H. Boylan State	Island Pond			X
Mount Snow	West Dover		X	
Post Mills	Post Mills			X
Shelburne	Shelburne			X
Warren-Sugarbush	Warren	X		

Source: Wilbur Smith Associates
*Not Applicable- no objective for airports with turf runways

Exhibit 6-11 shows that 75 percent of all system airports have primary runways that have pavements with at least a "good" rating. Airports with turf runways, which include several in the Specialty Service role, are not required to meet this benchmark. Airports that currently only have a "fair" pavement condition on their primary runway are Morrisville-Stowe, Mount Snow, and William H. Morse State. No runways at public-use airports in Vermont were reported to be in "poor" condition. It is worth noting that as pavement conditions at system airports change from year to year, the ability of system airports to meet the objective set for this benchmark will also change.

Exhibit 6-11
Performance Measure: Development
Airports Meeting Pavement Condition Objectives



Source: Wilbur Smith Associates

BENCHMARK: PERCENT OF SYSTEM AIRPORTS IN EACH ROLE HAVING AN AIRPORT LAYOUT PLAN (ALP) UPDATED IN THE LAST 10 YEARS

Having current planning documents is imperative to any major development and expansion of an aviation facility. Consequently, this characteristic is very important to the development and optimization of Vermont's aviation system. All airports in the Vermont system were evaluated for the currency of their Airport Layout Plans (ALPs) as displayed in **Table 6-2**.

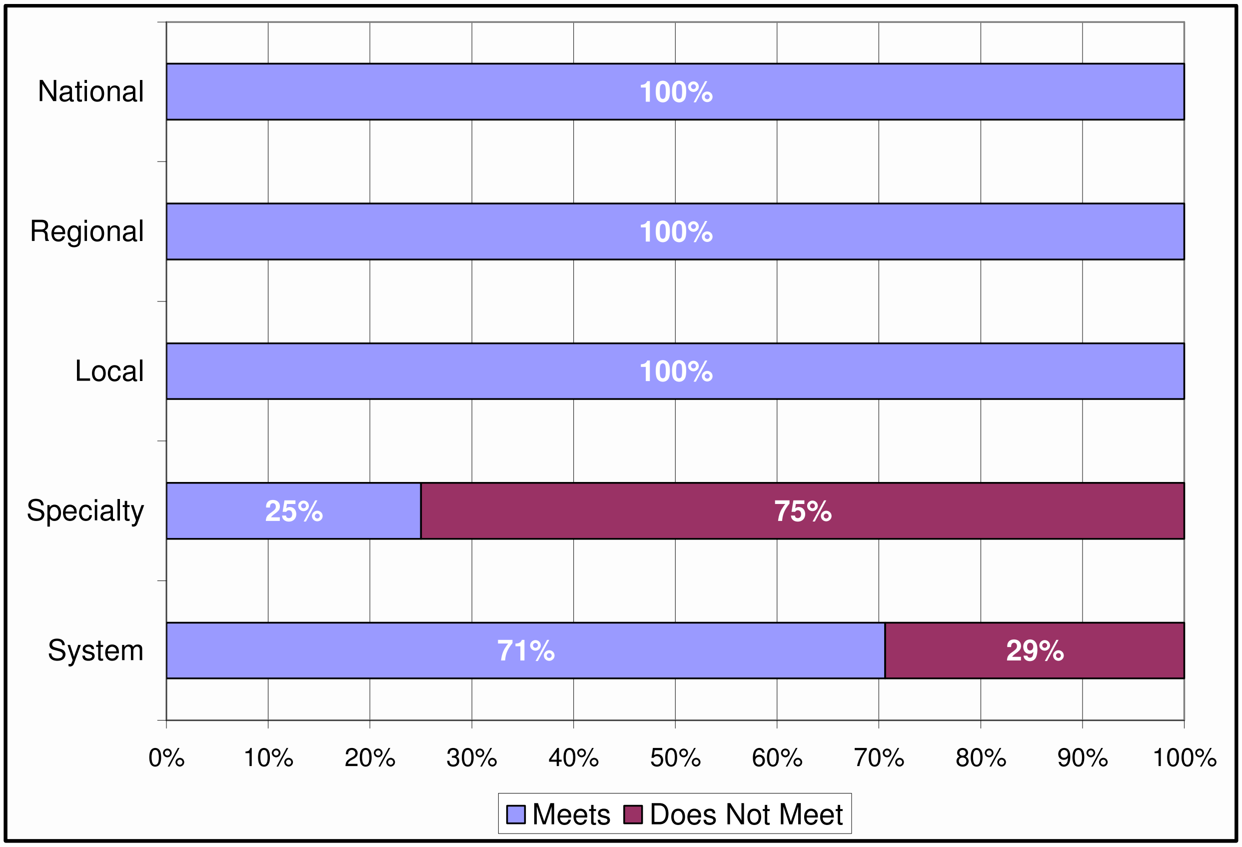
Table 6-2
Performance Measure: Development
Airports Having an ALP Updated in Past 10 Years

Airport Name	Associated City	Meets	Does Not Meet
National Service			
Burlington International	Burlington	X	
Edward F. Knapp State	Barre/Montpelier	X	
Rutland State	Rutland	X	
Regional Service			
Hartness State	Springfield	X	
Morrisville-Stowe State	Morrisville	X	
William H. Morse State	Bennington	X	
Local Service			
Caledonia County State	Lyndonville	X	
Franklin County State	Highgate	X	
Middlebury State	Middlebury	X	
Newport State	Newport	X	
Specialty Service			
Basin Harbor	Vergennes		X
Fair Haven Municipal	Fair Haven	X	
John H. Boylan State	Island Pond	X	
Mount Snow	West Dover		X
Post Mills	Post Mills		X
Shelburne	Shelburne		X
Warren-Sugarbush	Warren		X

Source: Wilbur Smith Associates

Of the 17 system airports, only five airports in the Specialty Service role have not had an ALP updated in the past 10 years. All of the airports in the National, Regional, and Local Service role (100 percent) have either updated their ALPs in the past 10 years or are currently in the process of updating, as depicted in **Exhibit 6-12**.

Exhibit 6-12
Performance Measure: Development
Airports Having an ALP Updated in Past 10 Years



Source: Wilbur Smith Associates

BENCHMARK: PERCENT OF SYSTEM AIRPORTS IN EACH ROLE HAVING LOCAL AIRPORT-RELATED ZONING

The long-term viability of airports in most systems can be threatened or endangered by encroachment from land uses or activities that are incompatible with an airport and its operation. For many airports, their zone of influence and potential impact extend to property that is not actually owned or controlled by the airport. In these instances, the airport must work with surrounding municipalities to implement land use controls or zoning that recognize the presence of the airport and its potential areas of impact.

Meeting this particular benchmark for the system is often times beyond an airport's control, as actions to implement zoning within the influence zones of each airport are at the discretion of the affected municipality or municipalities. Information was obtained from Vermont's Regional Planning Commissions related to airports and municipalities that have taken steps to consider some type of appropriate zoning with their local municipalities; the results from this analysis are shown in **Table 6-3.**

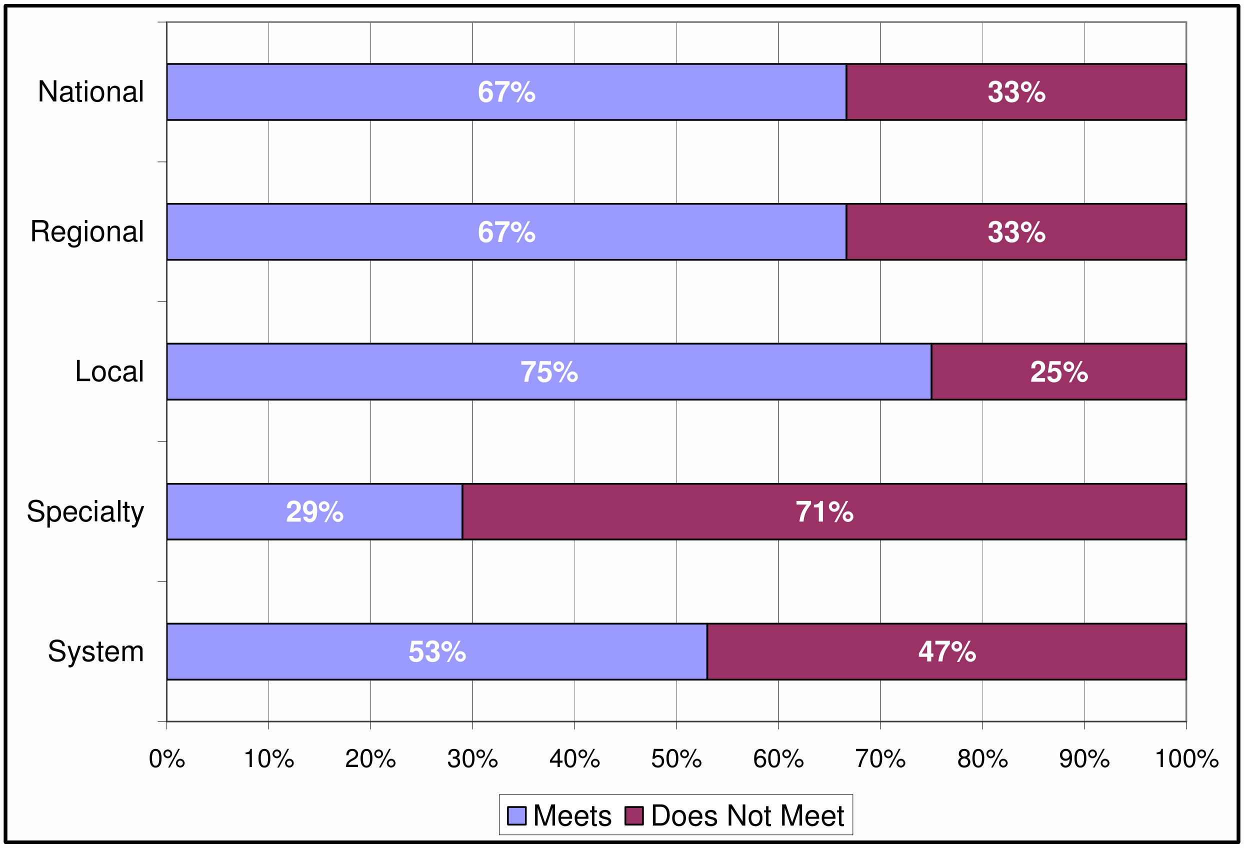
Table 6-3
Performance Measure: Development
Airports Having Local Airport-Related Zoning

Airport Name	Associated City	Meets	Does Not Meet
National Service			
Burlington International	Burlington	X	
Edward F. Knapp State	Barre/Montpelier		X
Rutland State	Rutland	X	
Regional Service			
Hartness State	Springfield		X
Morrisville-Stowe State	Morrisville	X	
William H. Morse State	Bennington	X	
Local Service			
Caledonia County State	Lyndonville	X	
Franklin County State	Highgate	X	
Middlebury State	Middlebury	X	
Newport State	Newport		X
Specialty Service			
Basin Harbor	Vergennes		X
Fair Haven Municipal	Fair Haven		X
John H. Boylan State	Island Pond		X
Mount Snow	West Dover	X	
Post Mills	Post Mills		X
Shelburne	Shelburne		X
Warren-Sugarbush	Warren	X	

Source: Wilbur Smith Associates

Overall, 53 percent of the system airports have some sort of local airport-related zoning, as shown in **Exhibit 6-13**. Sixty-seven percent of the National and Regional Service airports have local airport-related zoning, while 75 percent of Local Service airports meet this objective. Warren-Sugarbush and Mount Snow are the only airports in the Specialty Service role to have airport-related zoning.

Exhibit 6-13
Performance Measure: Development
Airports Having Local Airport-Related Zoning



Source: Wilbur Smith Associates

BENCHMARK: PERCENT OF SYSTEM AIRPORTS IN EACH ROLE THAT ARE INCLUDED IN REGIONAL LAND USE PLANS THAT INCLUDE AIRPORT-COMPATIBLE LAND USES IN THE AIRPORT ENVIRONS

As mentioned previously, the long-term viability of airports can be threatened or endangered by encroachment from land uses or activities that are incompatible with an airport and its operation. As a result, the Vermont Airport System was analyzed to determine which airports are included in regional land use plans that include airport-compatible uses within the airport environs. In some instances, the area surrounding an airport may be classified by a regional land use plan as compatible although the actual use upon the property may be considered non-compatible. **Table 6-4** depicts which airports meet this objective.

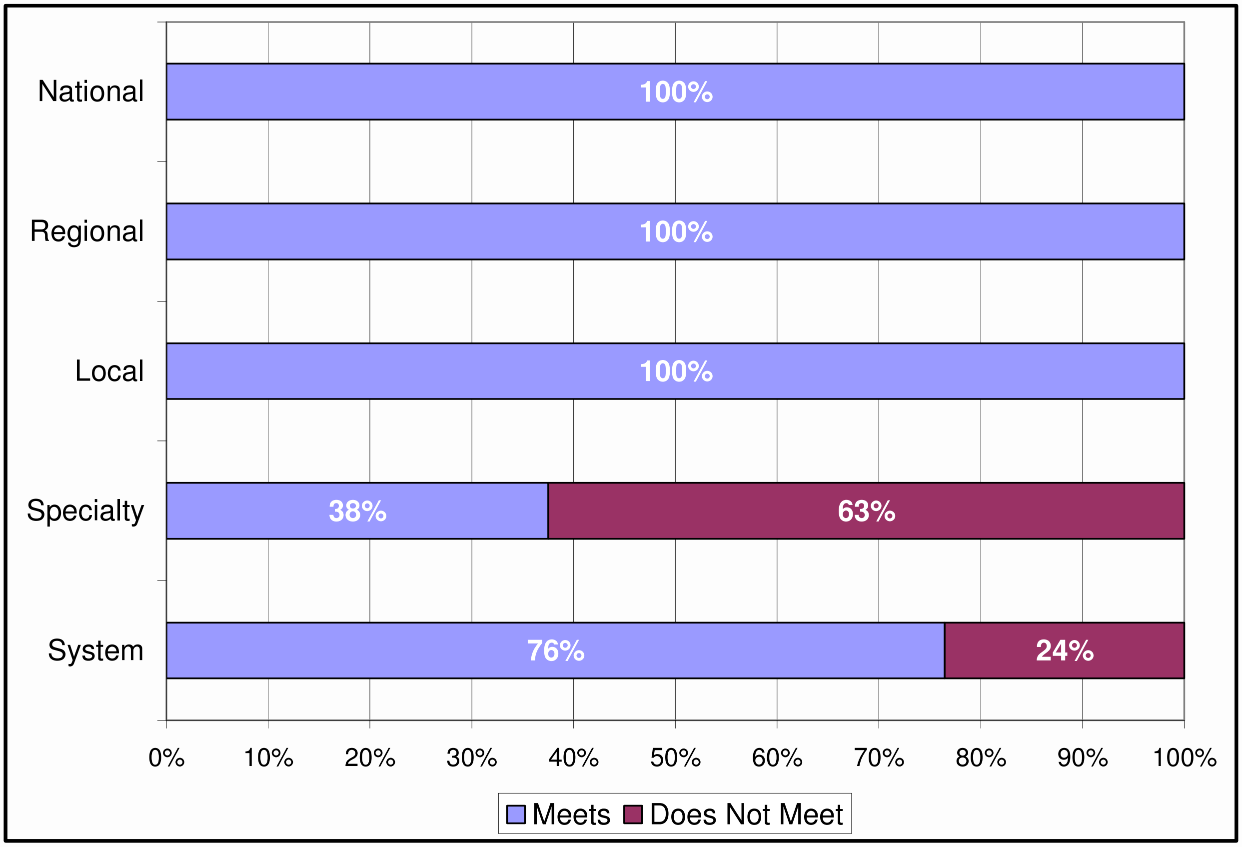
Table 6-4
Performance Measure: Development
Airports Included in Regional Land Use Plans with Compatible Land Uses in the Airport Environs*

Airport Name	Associated City	Meets	Does Not Meet
National Service			
Burlington International	Burlington	X	
Edward F. Knapp State	Barre/Montpelier	X	
Rutland State	Rutland	X	
Regional Service			
Hartness State	Springfield	X	
Morrisville-Stowe State	Morrisville	X	
William H. Morse State	Bennington	X	
Local Service			
Caledonia County State	Lyndonville	X	
Franklin County State	Highgate	X	
Middlebury State	Middlebury	X	
Newport State	Newport	X	
Specialty Service			
Basin Harbor	Vergennes		X
Fair Haven Municipal	Fair Haven	X	
John H. Boylan State	Island Pond	X	
Mount Snow	West Dover		X
Post Mills	Post Mills		X
Shelburne	Shelburne		X
Warren-Sugarbush	Warren	X	

Source: Wilbur Smith Associates
* According to planning documents, does not reflect true land coverage

All of the airports in the National, Regional, and Local Service roles meet this objective. Only 38 percent of the airports in the Specialty Service role are recognized in a regional land use plan that includes compatible land uses in the airport environs, as shown in **Exhibit 6-14**. Overall, 76 percent the study airports meet this objective.

Exhibit 6-14
Performance Measure: Development
Airports Included in Regional Land Use Plans with Compatible Land Uses in the Airport Environs*



Source: Wilbur Smith Associates
* According to planning documents, does not reflect true land coverage

PERFORMANCE MEASURE: SAFETY AND SECURITY

A third goal established by the Vermont Airport System Plan is to provide a safe and secure system of airports. As part of the safety and security performance measure, the number of system airports that meet objectives related to addressing safety and security concerns is evaluated. Safety and security objectives include those established by the FAA, VTrans, and the Transportation Security Administration (TSA). VTrans is currently undergoing an evaluation of the safety and security of the public-use airports in Vermont. As a result, it was determined by VTrans and the consultant that the Vermont Airport System could not be measured for compliance with these standards at the time of this study. Conclusively, it was recommended that the consultant identify specific objectives that VTrans can use for measuring the safety and security of the Airport System in the future.

To evaluate the adequacy of Vermont's Airport System relative to applicable safety and security measures, the following benchmarks were originally established:

- Percent of airports meeting applicable FAA airport design standards
- Percent of airports meeting applicable VTrans or TSA security-related recommendations

The following sections identify what should be measured in order to evaluate the safety and security of a state airport system.

BENCHMARK: PERCENT OF SYSTEM AIRPORTS IN EACH ROLE THAT MEET APPLICABLE FAA AIRPORT DESIGN STANDARDS

Airport design standards are established by the FAA to ensure that an airport is safe and efficient. Typically, any airport that has a proposed airfield improvement that is eligible for federal funding undergoes a detailed analysis by the FAA to ensure that all safety areas of the airfield are met before funding is approved. Vermont's Airport System should strive towards being in compliance with all FAA established safety areas, which include the Runway Safety Area (RSA), Runway Protection Zone (RPZ), and appropriate runway-taxiway separations.

The dimensions for the RSA are determined by the individual airport reference code (ARC) of each airport. ARCs were discussed as part of Chapter 3. The RSA is designed to promote and increase airport safety, and is defined as the surface surrounding the runway which is prepared or suitable for reducing the risk of damage to aircraft in the event of an undershoot or overshoot on the runway. The RSA, in accordance with FAA standards, should be free and clear of any obstructions; the RSA should also be graded, but not necessarily paved.

The dimensions of the RSA vary based on applicable design standards of ARC and approach visibility minimums for the respective runway. The FAA has set standards for both the length and width of the RSA for each Airport Reference Code, as per FAA AC 150/5300-13, change 10, *Airport Design*. Each airport in the Vermont Airport System should be evaluated to determine if existing RSA lengths and widths meet the standards based on each airport's current ARC.

The FAA has established standards for a number of surfaces around an airport to be free and clear of all or certain types of development. In particular, the FAA has standards that are applicable to the areas at the end of each active runway end that aircraft make their approach and departures over. These areas are known as Runway Protection Zones, and should be free of any obstructions to ensure a clear and safe approach can be made to a specific runway end. In addition, Federal Aviation Regulation (FAR) Part 77 surfaces, which detail the transitional surfaces that extend out from a runway centerline and should be free of objects that violate applicable height restrictions, must also be considered. Vermont's public-use airports should be evaluated to ensure that the RPZ for each active runway end in the State is free and clear of any obstructions and that the Part 77 surfaces meet standards.

Lastly, each airport's ARC specifies criteria for the separation of airfield components. One of the most important is the separation of the runway-taxiway system. Vermont's airports should be evaluated to determine if each airport's runway and its associated taxiway are separated by the appropriate distance specified by the FAA AC 150/5300-13, change 10, *Airport Design* manual.

Benchmark: Percent of system airports in each role that meet applicable VTrans or TSA security-related recommendations

As mentioned earlier in this section, VTrans is currently examining the security at the various public-use airports in the State. This will in turn allow VTrans to establish its own objectives and goals that would form a security policy plan for the system airports to abide. Objectives that VTrans may take into consideration when evaluating the security of the overall system include the percent of airports that have a written emergency response plan, wildlife management plan, and airports that have fuel farms that comply with the National Fire Protection Agency (NFPA). While VTrans may issue their own security and safety guidelines, the Transportation Security Administration (TSA) has specific recommendations for various types of general aviation airports.

The events of September 11th, 2001, had a profound impact on the aviation industry, with repercussions felt in both commercial and general aviation. The federal government initiated rapid changes to transportation security, creating a new federal agency, the Transportation Security Administration (TSA). The TSA released its *Security Guidelines for General Aviation Airports* in May 2004. These guidelines were produced from recommendations made by the Aviation Security Advisory Committee (ASAC) Working Group, which worked with FAA and TSA officials. These guidelines provide airport owners, operators, sponsors, and other entities charged with oversight of general aviation airports a set of federally endorsed security enhancements. The guidance recognizes, and in fact emphasizes, that every airport is different, and that security enhancements that are appropriate and needed at one airport may not be warranted or even needed at another. It should be noted that these security suggestions are not applicable to airports requiring a TSA-approved security plan (those required to comply with 49 CFR 1542, *Airport Security*). The Vermont Airport System should be evaluated in the future to determine the appropriate level of security needed at each airport, and if each airport meets its specific objectives.

SUMMARY

The analysis contained in this chapter summarizes the existing performance of Vermont's airport system based on the roles that were initially identified for each of the 17 airports. This analysis can be considered a "report card" on existing activities. The next chapter analyzes future needs of Vermont's airport system, including the identification of projects that are needed for the system to perform at its recommended level. This analysis provides the baseline for developing system recommendations and quantifying future system performance improvements.

Chapter Seven: Future System Performance and Recommendations

INTRODUCTION

The prior chapter of the Vermont Airport System Plan provided an overview of the current performance of Vermont's public-use airports. Current system performance was evaluated and determined using applicable facility and service objectives, system performance measures and study benchmarks. This chapter of the System Plan sets the course for future system performance by setting targets for how each airport in the system and the system as a whole should ideally function in the future to meet the State's air transportation and economic needs. These target performance objectives provide the basis for system recommendations which are also documented in this chapter.

Stratification of the airports into functional roles within the Vermont Airport System, identified in Chapter Three, provides a baseline for evaluating the existing Airport System. Performance measures, with specific benchmarks for each measure, are used to evaluate the system to determine its current performance. This evaluation provides an indication of where the current airport system is adequate to meet the State's near and long-term aviation needs, identifies specific airport or system deficiencies, and helps to establish surpluses or duplications within the system that can be addressed in the future. This evaluation provides the foundation for subsequent recommendations for the Vermont Airport System, as well as for individual study airports.

This chapter addresses future system performance and recommendations as it relates to:

- Accessibility
- Development
- Safety & Security

Target Performance Measure: Accessibility

Benchmark: percent of Vermont's population and land area within 60-minutes of an airport with commercial service

It is generally desirable for most, if not all, of a state's population to be within a 60-minute drive of a commercial service airport. It has been targeted for the Vermont Airport System Plan that between 90 and 95 percent of Vermont's population should be located within a 60-minute drive time of commercial air service. Scheduled commercial airline service within Vermont is provided at Burlington International and Rutland State. It is important to note that commercial airline service at Rutland State is supported by federal operating subsidies through the Essential Air Service (EAS) program. Access for Vermonters provided by the two commercial service facilities is supplemented by service at out-of-state commercial service airports. It is estimated that 93 percent of Vermont's population has access to commercial air service within a 60-minte drive time, while 75 percent of the land area within the State falls within this drive time. This includes coverage by three out-of-state commercial service airports serving the communities of:

- Albany, New York
- Lebanon, New Hampshire
- Plattsburgh, New York

The existing coverage provided by Vermont's two commercial service airports and the three out-of-state airports that are within reasonable access to Vermonters is considered to be adequate. The future of access to commercial service airports would likely change only if Rutland State loses its EAS subsidy and airline service is no longer subsidized. Without subsidization, Rutland might lose its commercial airline service, reducing the commercial service coverage provided to only 83 percent of Vermont's population, which is below the target set for this benchmark.

The recommendation for this benchmark is to support continuation of the EAS program to ensure commercial airline service is provided at Rutland State Airport. The EAS program continues to be at risk of being reduced or eliminated at the national level due to funding issues and support from Vermont is needed to show the importance of this program to the State's accessibility to commercial airline service.

Benchmark: Percent of Vermont's population within 30-minutes of an airport with a 5,000-foot long runway

As mentioned in previous chapters, the typical minimum runway length needed to accommodate a high percentage of business jet traffic in Vermont is approximately 5,000 feet. This minimum length is a recommended objective for the Regional Service airports, although National Service airports should also exceed this objective since they are recommended to have a minimum of 5,500 feet of paved runway length. Currently, only 62 percent of the State's population is within a 30-minute drive time of an airport with a runway length of 5,000 feet or greater. It is important to note when establishing targets for this benchmark that some airports currently assigned to the Regional Service role do not meet the 5,000-foot long runway length objective. It is also worth noting that to address other target objectives for the system that additional airports may be assigned to either the National or Regional role. It is recommended as a future target that between 70 and 75 percent of the State's population should be within a 30-minute drive time of an airport with a runway length of 5,000 feet or greater. If all of the airports currently placed into the National and Regional Service role met their associated runway length objectives, approximately 72 percent of Vermont's population would be within this coverage. All of the airports initially designated in the National Service role have at least 5,000 feet of paved runway. **Table 7-1** depicts which airports do not currently meet the 5,000-foot long runway length objective in the Regional Service role and their associated deficiencies.

Lebanon Municipal Airport in New Hampshire was ruled to meet the 5,000-foot long runway requirement. Using GIS analysis it was noted that approximately 5 percent of Vermont's population was located within a 30-minute drive time of Lebanon. This increases coverage to 67 percent of Vermont's population that is within a 30-minute drive of an airport with a runway length of at least 5,000 feet.

Table 7-1
Regional Airports With a 5,000' or Less Runway Length

Airport Name	Associated City	Current Length	Objective Length	Length Needed to Meet 5,000' Objective
Regional Service				
Morrisville-Stowe State	Morrisville	3,701'	5,000'	1,299'
William H. Morse State[1]	Bennington	3,704'		1,296'

Source: Wilbur Smith Associates

In order to meet the 70 to 75 percent target for population within 30-minutes of a 5,000-foot or longer runway, it is recommended that runway extensions at Morrisville-Stowe State and William H. Morse State Airport be considered. It is important to note that prior to construction of runway extensions, each airport would be required to justify the need for the extension, as well as conduct required environmental documentation. The justification and environmental process may result in a recommendation for a different runway length.

The need for either of these airports to serve a National role within the Vermont Airport System is examined in a subsequent section. If either of these airports is identified as a candidate for a National role, a minimum runway length of 5,500 feet would be necessary to meet the objectives. It should be noted that William H. Morse State is currently pursuing a runway extension to give the airport 4,000 feet of paved runway in the near future, with the possibility of extending the runway beyond that length in the five to 10-year timeframe.

If William H. Morse State was successful in obtaining at least 5,000 feet of runway, the target for this benchmark would be met.

BENCHMARK: PERCENT OF VERMONT'S POPULATION WITHIN 30-MINUTES OF AN AIRPORT WITH A 5,000-FOOT LONG RUNWAY HAVING A PRECISION APPROACH

Only two airports in Vermont currently have a runway that is 5,000 feet or longer and also have a precision approach. This provides 44 percent of Vermont's population access 30-minute access to an airport with a 5,000-foot long runway that has a precision approach. The Vermont Airport System Plan has set a future target that at least 50 percent of Vermont's population be located within the 30-minute drive time coverage of airports with a 5,000-foot long runway and a precision approach.

[1] William H. Morse State is recommended in a subsequent section of this chapter to be upgraded to a National Service airport. As a result, in later analysis the recommended runway length for this airport will be 5,500', which is the objective for the National Service role.

It should be noted that Lebanon Municipal Airport meets these criteria, and provides coverage to an additional 5 percent of Vermont's population, increasing the coverage to 49 percent.

The National Service role airports were recommended to have a minimum runway length of 5,500 feet and a precision approach. All three airports in this role currently have at least 5,000 feet of paved runway, but only Burlington International and Edward F. Knapp Airport currently have precision approaches. If Rutland State Airport met the precision approach objective associated with the National Service role, 60 percent of the State's population would be within the 30-minute drive time coverage of these airports, which would satisfy the future target.

The State has been pursuing development of a precision-type approach at Rutland State Airport for several years. There are currently partial funds set aside for the installation of a MALSR approach lighting system. Once installed, this will provide one more step towards providing precision instrument capabilities at Rutland State Airport.

BENCHMARK: PERCENT OF VERMONT'S POPULATION AND LAND AREA WITHIN 30-MINUTES OF AIRPORTS IN EACH ROLE CATEGORY

Current roles for all public-use airports in Vermont were determined based on a series of criteria and factors discussed in Chapter Three. When current roles were identified, it was understood that the future roles for some system airports could be changed based on the identified needs of the future system. Initially, airports were assigned to the National, Regional, Local, and Specialty Service roles based on existing conditions. Chapter Six then analyzed the amount of coverage each airport service role provided in regards to the amount of population and land area within a 30-minute drive time. The purpose of this analysis is to determine if the existing coverage provided by each role is adequate for Vermont's Airport System to meet future needs.

Not every airport role category is intended to provide the same amount of coverage, as the types of users and amount of demand for each type of airport role differs. Accessibility targets have been developed for the airport roles based on evaluation of Vermont's future transportation and economic needs. These accessibility targets considered how other state airport systems have been developed and if Vermont's Airport System would provide comparable service to its residents and visitors.
As mentioned in the previous chapter, airports in a higher role are considered to meet the facility and service objectives for a lower role. For example, National Service airports are considered to also serve as Regional and Local airports since the facilities and services recommended for National Service airports are beyond those recommended for the other categories. As a result, the amount of coverage provided

by each role compounds from the National Service level down to the Specialty Service airports, with each category serving a higher percentage of the population. It is recommended that airports in the following roles serve the following levels of population within a 30-minute drive time:

- National Service Airports – 60 to 65 percent of the population
- Regional Service Airports – 70 to 75 percent of the population
- Local Service Airports – 85 to 90 percent of the population
- Specialty Service Airports – No specific target

It is important to note that the Specialty Service Airports serve a unique role in Vermont's Airport System. These airports provide service to activities such as recreational, sport, balloon, and other specialties that typically prefer to be located away from larger aircraft. These types of specialty activities usually assemble at smaller airports that cater to their needs and specifically to one type of activity. No targets were set for airports to serve these types of activities since they are specialized.

National Service

National Service airports are targeted to be within a 30-minute drive time of 60 to 65 percent of Vermont's population. These airports provide the highest level of services and facilities and accommodate the most demanding aircraft. The three airports that were originally placed in the National Service role only provide coverage to 55 percent of the State's population. The current coverage has been determined not to be adequate to meet future needs.

Out-of-state airports located within a 30-minute drive time that have facilities and services that meet the objectives set forth for the National Service role were examined to see if any additional coverage is provided to Vermonters. Lebanon Municipal Airport, located in New Hampshire east of Rutland, was the only airport noted to have facilities and services that meet the objectives of a National Service airport. Lebanon Municipal Airport provides coverage to users in an area of Vermont where coverage for this role is currently not being provided by the three National Service airports. Using GIS, it is estimated that approximately 5 percent of Vermont's population is within a 30-minute drive time of Lebanon Municipal Airport. This additional out-of-state coverage aids in helping the State meet the minimum 60 percent population coverage for this objective. Even with the additional National Service role coverage provided by Lebanon Municipal, it is still important that consideration of additional coverage in southern Vermont be undertaken.

Airports in the Regional role were examined to determine which airports, if upgraded to National Service, would provide the most additional access to the State's population and which airports were close to meeting the existing facility and service objectives for National Service airports. It was determined using GIS analysis that by moving William H. Morse State from a Regional Service to a National Service airport and including coverage provided by Lebanon Municipal in New Hampshire, approximately 67 percent of Vermont's population would be within a 30-minute drive time of National Service airports. No out-of-state public-use airports within the vicinity of William H. Morse State have runway lengths close to 5,500 feet, which is an objective for the National Service airports. By upgrading William H. Morse State's role, the accessibility target of 65 percent by National Service airports can be met. Although the coverage provided by Lebanon Municipal Airport may be enough to meet the minimum benchmark, it was determined that the coverage provided by upgrading William H. Morse State is in an area of significant population that is only served by one other privately-owned public-use airport, Mount Snow, which is categorized as a Specialty Service airport. In order for William H. Morse State to effectively serve as a National Service airport, the facility and service objectives for that role should also be met. The ability of William H. Morse State Airport to meet the facility and service objectives will be addressed in a subsequent section.

Regional Service

Assuming William H. Morse State Airport is included as a National Service airport, only two airports would remain in the Regional Service role as originally stratified in Chapter Three. It is recommended that between 70 and 75 percent of Vermont's population be within a 30-minute drive time of a Regional Service airport. As mentioned in earlier chapters, higher tier airports, such as those in the National Service role, are considered to meet the minimum objectives of a lower role such as Regional Service. When considering the coverage provided by the Regional and National airports, approximately 75 percent of Vermont's population is within the coverage provided by the airports in these categories, which is considered to meet the target for Regional Service airports. No airports are recommended to be advanced to the Regional Service role.

Local Service

It is recommended that between 85 and 90 percent of the State's population be within a 30-minute drive time of a Local Service airport. The coverage of Vermont's population provided by the Local Service airports exclusively is only 27 percent. However, combined with that of the National and Regional Service airports, approximately 92 percent of Vermont's population is within a half an hour by car of a Vermont public-use airport. As a result, there currently is sufficient coverage that meets the established target.

Specialty Service

There is no specific target for the amount of population that should be within a certain drive time from a Specialty Service airport. National, Regional, and Local Service airports provide coverage to nearly 90 percent of the State's population. When Specialty Service airports are added, approximately 95 percent of Vermont's population is within a 30-minute drive of some type of public-use airport. While it is desirable for the entire population to be within 30 minutes of a public-use airport, this is considered to be sufficient coverage. As a result, no new aviation facilities are proposed for the State.

Target Performance Measure: Development

Development of Vermont's aviation system should seek to preserve and enhance existing airport infrastructure, as appropriate, to maintain the State's access to the national air transportation system. A good airport system should be adequately developed and planned, and provide airside and landside infrastructure and facilities to meet both current and future demand. While landside facilities are typically addressed in an airport master plan, the Vermont Airport System Plan analyzed selected landside facilities to provide a general overview of the system's ability to provide adequate capacity to meet current and future demand.

Benchmark: Percent of Vermont's population and land area exclusively served (Within 30 minutes) of a privately-owned airport

To ensure the longevity and future enhancements of Vermont's public-use airports, it is desirable that many of the State's public-use airports be publicly owned. Vermont has five public-use airports that are privately owned, which makes them ineligible for FAA Airport Improvement Program (AIP) funds. In addition, these airports could close at any time, taking away air accessibility to the State's population served by these airports.

It has been targeted that no more than 5 percent of Vermont's population be exclusively served by a privately owned airport. Currently, 8 percent of the population is within a 30-minute drive time of only a privately owned public-use airport. Out-of-state public-use airports, including Lebanon Municipal and Dean Memorial, both of which are in New Hampshire and publicly-owned, do provide some overlapping coverage with that of Post Mills in the eastern part of the State. This out-of-state coverage helps to reduce the overall dependency that Vermonters have on privately-owned airports in the State. It is recommended that the coverage exclusively provided by privately-owned airports not increase in the future, and when and if possible, that the level of population served exclusively by these airports be decreased. While Vermont does not desire to own any additional airports, the State is concerned with losing additional airports to non-aviation use and would work closely to encourage the long-term viability of the privately-owned airports.

BENCHMARK: PERCENT OF SYSTEM AIRPORTS MEETING MINIMUM FACILITY AND SERVICE OBJECTIVES

The previous chapter of the Vermont Airport System Plan analyzed the ability of the system to meet minimum facility and service objectives established for each airport role. This analysis examined each airport's ability to meet current demand for airside facilities such as runway length, taxiways, and NAVAIDs, as well as landside facilities including covered storage, automobile parking, and the terminal/administration building based on their role's facility and service objectives. In this section, the airport system is analyzed for its ability to meet future demand for the same airside and landside facilities and services.

Since airports in the system serve different roles, their need to provide facilities in each of these categories also varies. An objective has been established to have all system airports be 100 percent compliant with the current and future facility and service objectives for their respective system roles. It should be noted that this is only an objective, and that some airports may not have the ability to fully meet the objectives due to constraints that are both physical and economical. However, it is recommended that all airports strive to meet these objectives when and if possible.

FUTURE ARC ANALYSIS

Each airport's ability to meet its applicable FAA design standards is primarily a function of the master planning process, rather than the system planning process. To assess the performance of the Vermont Airport System Plan, it was nevertheless important to evaluate the ability of the airports and the system to meet basic design standards. A target of 100 percent has been set for all system airports to meet their Airport Reference Code (ARC) objective. As discussed in Chapter Six, only one airport, Edward F. Knapp State, did not meet the current objective for the National Service role. With the recommended upgrade of William H. Morse State to a National Service airport, its current ARC also does not meet the objective for this role. This decreases the overall current system compliance to 88 percent. The following airports are not currently meeting their future ARC objective:

- **National Service Airports**
    - Edward F. Knapp State
    - William H. Morse State

Table 7-2 provides information by airport role on which facilities fall short of their ARC objective.

Table 7-2
Future ARC Objective

Airport Name	Associated City	Current ARC	ARC Objective
National Service			
Edward F. Knapp State	Barre/Montpelier	B-II	C-II
William H. Morse State	Bennington	B-II	

Source: Wilbur Smith Associates

It is recommended that these airports strive to meet the requirements associated with an ARC of C-II. This would require the airports to meet all the runway/taxiway separations and secure the associated safety areas in and around the runway system in order to meet the standards of the C-II ARC.

FUTURE RUNWAY LENGTH ANALYSIS

The target performance set for this benchmark is to have 100 percent of all system airports meet their respective primary runway length objective. Currently, 30 percent of the system airports comply with the primary runway length benchmark. It should be noted that the objective for Specialty Service airports only recommends that airports maintain their existing facilities. The original runway length objectives are suitable for future performance and are not recommended to change. It should be noted that any runway extension would require justification, proper environmental documentation, and securing of all associated safety areas in order to be eligible for FAA funding. As a result, airports may not be able to implement some of the recommendations in this section due to environmental and/or man-made constraints that limit the development of airport runways.

Airports that do not currently meet their minimum runway length objective for their role are:

- **National Service Airports – 5,500'**
  - Edward F. Knapp State
  - Rutland State
  - William H. Morse State
- **Regional Service Airports – 5,000 feet**
  - Morrisville-Stowe State
- **Local Service Airports – 4,000 feet**
  - Caledonia County State
  - Franklin County State

- Middlebury State

Table 7-3 lists the primary runway length deficiencies for the system.

Table 7-3
Future Runway Length Objective Analysis

Airport Name	Associated City	Current Length	Length Objective	Deficiency
National Service				
Edward F. Knapp State	Barre/Montpelier	5,002'	5,500'	Deficient by 498'
Rutland State	Rutland	5,000'		Deficient by 500'
William H. Morse State[2]	Bennington	3,704'		Deficient by 1,796'
Regional Service				
Morrisville-Stowe State	Morrisville	3,701'	5,000'	Deficient by 1,299'
Local Service				
Caledonia County State	Lyndonville	3,300'	4,000'	Deficient by 700'
Franklin County State	Highgate	3,000'		Deficient by 1,000'
Middlebury State	Middlebury	2,500'		Deficient by 1,500'

Source: Wilbur Smith Associates

FUTURE RUNWAY WIDTH ANALYSIS

The target performance set for this benchmark is to have 100 percent of all system airports meet their respective runway width objectives. Currently, 62 percent of all public-use airports currently comply with their runway width objectives. With the movement of William H. Morse to the National Service role, the airport falls short of meeting its new role's recommended runway width objective. As a result, the current system compliance falls to 54 percent. Airports that do not currently meet the primary runway width objective for the System Plan for their role are:

- **National Service Airports – 100 feet**
  - William H. Morse State
- **Local Service Airports – 75 feet**
  - Caledonia County State
  - Franklin County State
  - Middlebury State
- **Specialty Service Airports – 60 feet for NPIAS airports**
  - Fair Haven Municipal
  - Warren-Sugarbush

[2] William H. Morse State was recommended in Table 7-1 to have 5,000' of runway. As mentioned earlier, since it has been recommended that the Airport upgrade its facilities to those of the National Service role, a minimum of 5,500' of runway should be the Airport's ultimate objective.

Table 7-4 shows the airports that do not meet their runway width objectives and their deficiencies.

Table 7-4
Future Runway Width Objective Analysis

Airport Name	Associated City	Current Width	Width Objective	Deficiency
National Service				
William H. Morse State	Bennington	75'	100'	Deficient by 25'
Local Service				
Caledonia County State	Lyndonville	60'	75'	Deficient by 15'
Franklin County State	Highgate	60'		Deficient by 15'
Middlebury State	Middlebury	50'		Deficient by 25'
Specialty Service				
Fair Haven Municipal	Fair Haven	20'	60'	Deficient by 40'
Warren-Sugarbush	Warren	30'		Deficient by 30'

Source: Wilbur Smith Associates

FUTURE RUNWAY STRENGTH ANALYSIS

Eighty percent of Vermont's system airports currently meet their runway strength objective. The recommended strengths for each role have been determined to be sufficient for future activity. It is recommended that all airports in the system meet the identified strength benchmark for their role. The following airports have runways that are deficient of their role's strength objective:

- **National Service Airports – 60,000 pounds**
  - William H. Morse State
- **Regional Service Airports – 30,000 pounds**
  - Morrisville-Stowe State

Table 7-5 shows the runway strength deficiencies at the airports that do not meet their recommended objective. Morrisville-Stowe State should consider a runway overlay in order to increase the strength of the runway by 5,000 pounds. Consideration of a complete reconstruction of the runway at William H. Morse State be undertaken in order to increase its strength by more than 47,000 pounds. It should be noted that the current strength of each airport's runway is sufficient for their existing users. However, since the runway length objectives for William H. Morse State and Morrisville-Stowe State are 5,500' and 5,000', respectively, strengthening projects would only be required in order to support the larger aircraft that could operate at the airports as a result of the runway extensions.

Table 7-5
Future Runway Strength Objective Analysis

Airport Name	Associated City	Current Strength	Strength Objective	Deficiency
National Service				
William H. Morse State	Bennington	12,500 lbs.	60,000 lbs.	47,500 lbs. /Runway Reconstruction
Regional Service				
Morrisville-Stowe State	Morrisville	25,000 lbs.	30,000 lbs.	5,000 lbs. /Runway Overlay

Source: Wilbur Smith Associates

FUTURE TAXIWAY ANALYSIS

Fifty percent of the public-use airports in Vermont currently meet the study's taxiway objectives. In order to meet the established 100 percent target for this benchmark, all airports should meet the taxiway type objectives for their respective roles. The airports in each of the following three service roles do not comply with their taxiway type objectives:

- **National Service Airports – Full Parallel Taxiway**
  - Edward F. Knapp
  - Rutland State
  - William H. Morse State
- **Regional Service Airports – Full Parallel Taxiway**
  - Hartness State
  - Morrisville-Stowe State
- **Specialty Service Airports – Connectors or Turnarounds, Partial Parallel Desired for Paved Runways**
  - Mount Snow

Airports that do not currently meet the future taxiway objective for their respective role are listed in **Table 7-6**.

Table 7-6
Future Taxiway Objective Analysis

Airport Name	Associated City	Current Taxiway	Taxiway Objective
National Service			
Edward F. Knapp State	Barre/Montpelier	Partial Parallel	Extend to a Full Parallel on RWY 17-35
Rutland State	Rutland	Partial Parallel, Connectors	Construct Full Parallel on RWY 1-19
William H. Morse State	Bennington	Connectors	Construct Full Parallel on RWY 13-31
Regional Service			
Hartness State	Springfield	Connectors, Turnarounds	Construct Full Parallel on RWY 5-23
Morrisville-Stowe State	Morrisville	Connectors	Construct Full Parallel on RWY 1-19
Specialty Service			
Mount Snow	West Dover	Connectors	Construct Turnarounds on RWY 1-19

Source: Wilbur Smith Associates

FUTURE APPROACH ANALYSIS

As mentioned in Chapter Six, airports were evaluated based on the type of the most demanding approach available or currently published to the airport. The following airports do not meet the objectives that were developed for each of the roles:

- **National Service Airports – Precision Approach (Ceiling Minimum of 200 feet or less and Visibility Minimum of ½ mile or less)**
  - Edward F. Knapp State
  - Rutland State
  - William H. Morse State
- **Regional Service Airports – Non-Precision Approach (Ceiling Minimum of 400 feet or less and Visibility Minimum of 1 mile or less)**
  - Hartness State
  - Morrisville-Stowe State
- **Local Service Airports – Non-Precision Approach (Ceiling Minimum of 1,000 feet or less and Visibility Minimum of 3 miles or less)**
  - Caledonia County State
  - Franklin County State
  - Middlebury State

Table 7-7 depicts the current approach minima at airports that do not meet their role's objective in addition to the deficiencies in ceiling height and visibility minimums.

Table 7-7
Future Approach Objective Analysis

Airport Name	Associated City	Current Approach	Approach Objective	Deficiency
National Service				
Edward F. Knapp State	Barre/Montpelier	Precision 300'/1 ¼ Mile	Precision 200'/½ Mile	100'/ ¾ Mile
Rutland State	Rutland	Non-Precision 1,413'/1 ¼ Mile	Precision 200'/½ Mile	1,213'/ ¾ Mile
William H. Morse State	Bennington	Non-Precision 1,222'/1 ¼ Mile	Precision 200'/½ Mile	1,022'/ ¾ Mile
Regional Service				
Hartness State	Springfield	Non-Precision 985'/1 ¼ Mile	Non-Precision 400'/1 Mile	585'/ ¼ Mile
Morrisville-Stowe State	Morrisville	Non-Precision 828'/1 Mile	Non-Precision 400'/1 Mile	428'/---
Local Service				
Caledonia County State	Lyndonville	Non-Precision 555'/ 1 Mile	Non-Precision 1,000'/3 Miles	445'/---
Franklin County State	Highgate	Non-Precision 632'/1 Mile	Non-Precision 1,000'/3 Miles	368'/---
Middlebury State	Middlebury	Visual	Non-Precision 1,000'/3 Miles	1,000'/3 Miles

Source: Wilbur Smith Associates

Although it is desirable that the 100 percent target be met for all facility and service objectives, factors such as terrain and flight path obstructions limit the ability of certain airports to meet their recommended approach objectives. However, it is desirable that at a minimum, airports meet their recommended type of instrument approach, and not necessarily their associated ceiling height and visibility minimums. Rutland State and William H. Morse State in the National Service role do not have precision approaches, and therefore do not currently meet this objective. Middlebury State, in the Local Service role, is the only other airport that does not meet its type of approach objective.

Rutland State has plans to install a Medium Intensity Approach Lighting System Runway Alignment Indicator Lights (MALSR) in the near future. Once the MASLR is installed, the approach minimums may be reduced, and will help bring the airport one step closer to securing a precision approach.

Instrument Landing Systems (ILS) have traditionally provided precision instrument approach capabilities at airports. These land-based facilities however are often subject to interference with terrain, which make them either costly to install and maintain or prohibits their use altogether. The FAA has developed a plan for an extensive national airspace (NAS) modernization program with Global Positioning System (GPS) as the core technology. GPS is a space-based satellite navigation system free from terrain interference. These systems are significantly less costly to maintain than conventional land-based facilities. GPS is the basis of Wide Area Augmentation System (WAAS), an Approach Procedure with Vertical Guidance (APV). This relatively new category of instrument approaches includes the WAAS approach technology, Lateral Precision with Vertical Guidance (LPV). LPV has been operational since 2003, and currently provides precision approach accuracy with Category I descent minimums (200 feet above the ground's surface).

Although the LPV approaches are not true precision approaches, they provide near precision capabilities when landing an aircraft. The only downside to this system is that aircraft will be required to have the appropriate equipment installed to utilize the approach, which can be costly to the pilot to install.

The FAA is also developing the Global Navigation Satellite System Landing System (GLS). GLS, which is programmed to come online by 2013, will provide Category II and III approach minimums to more runways in the U.S. than are currently available from traditional ILS technology.

The next section will note which airports are deficient of the NAVAIDs necessary to meet their recommended type of approach. For those airports in the National Service role that do not have a precision approach, a GPS-based approach with precision-like capabilities should be sought.

FUTURE NAVAID ANALYSIS

Each airport's ability to meet the NAVAIDs objective was discussed in Chapter Six. The System Plan's objective for NAVAIDs is for all airports to have 100 percent future compliance with their role's objectives based on the FAA's criteria. Currently, only 50 percent of the airports in Vermont meet their NAVAID objectives. With the movement of William H. Morse State to a National Service airport, the current system compliance falls to 40 percent due to the lack of a precision approach at that airport. Those airports that do not currently meet their objectives are listed below in **Table 7-8**, in addition to the deficiency for the airport to meet its benchmark.

Table 7-8
Future Airport NAVAID Objective Analysis

Airport Name	Associated City	NAVAID Objective Needs
National Service		
Edward F. Knapp State	Barre/Montpelier	Lighted Wind Cone
Rutland State	Rutland	Precision GPS, ALS
William H. Morse State	Bennington	Precision GPS, ALS
Regional Service		
Hartness State	Springfield	Lighted Wind Cone
Local Service		
Caledonia County State	Lyndonville	Rotating Beacon, Lighted Wind Cone
Middlebury State	Middlebury	VGSIs, Rotating Beacon, Lighted Wind Cone

Source: Wilbur Smith Associates

William H. Morse State has received an earmark for a Transponder Landing System (TLS) that is awaiting FAA approval and installation. TLS has been certified as a Category I precision landing aid, and can provide a ceiling minima as low as 200 feet and a visibility minima as low as ½ mile. If the TLS is approved by the FAA and installed at William H. Morse State, the airport would be considered to meet their NAVAID and approach objectives. However, if the potential for the installation of a precision GPS based system is available, this should also be considered by VTrans.

FUTURE LIGHTING ANALYSIS

Runway and taxiway edge lights provide guidance and visibility to pilots during periods of darkness or restricted visibility conditions. Sixty percent of the airports in Vermont were found to currently meet the study's lighting objectives. William H. Morse State does not meet the lighting objective for National Service airports which drops the current system compliance to only 50 percent. In order to meet the future target of 100 percent for this development benchmark, all National, Regional, and Local Service airports should meet their role's lighting objectives. Airports not currently meeting their runway and taxiway lighting objectives are:

- **National Service Airports – HIRL/MITL**
    - Edward F. Knapp State
    - Rutland State
    - William H. Morse State
- **Local Service Airports – MIRL/MITL**
    - Caledonia County State
    - Middlebury State

Table 7-9 indicates which airports currently do not meet their respective lighting objectives. It should be noted that in order to "meet" this benchmark, potential runway and taxiway lighting projects are listed.

Table 7-9
Future Lighting Objective Analysis

Airport Name	Associated City	Current Lighting	Lighting Objective
National Service			
Edward F. Knapp State	Barre/Montpelier	MIRL	Upgrade to HIRL, Install MITL
Rutland State	Rutland	MIRL	Upgrade to HIRL, Install MITL
William H. Morse State	Bennington	MIRL	Upgrade to HIRL, Install MITL
Local Service			
Caledonia County State	Lyndonville	LIRL	Upgrade to MIRL
Middlebury State	Middlebury	None	Install MIRL

Source: Wilbur Smith Associates

FUTURE WEATHER REPORTING ANALYSIS

On-site weather reporting equipment at an airport can complement a facility's precision or non-precision approach capabilities, as well as promote an increased safety margin during periods of inclement or changing weather. For this benchmark, all airport roles except Specialty Service included an objective to have automated weather reporting, either through an automated surface observing system (ASOS) or an automated weather observing system (AWOS). All airports are recommended to have a Pilot Weather Briefing System (PWBS) in operation.

Table 7-10 indicates which airports, by role, do not meet the weather reporting objectives and potential weather reporting projects in order to meet the future target benchmark of 100 percent for the system.

Table 7-10
Future Weather Reporting Objective Analysis

Airport Name	Associated City	Current Weather Reporting	Weather Reporting Objective
Local Service			
Middlebury State	Middlebury	PWBS	Install ASOS or AWOS
Specialty Service			
Basin Harbor	Vergennes	None	Install PWBS
Fair Haven Municipal	Fair Haven	None	Install PWBS
John H. Boylan State	Island Pond	None	Install PWBS
Mount Snow	West Dover	None	Install PWBS
Post Mills	Post Mills	None	Install PWBS
Shelburne	Shelburne	None	Install PWBS
Warren-Sugarbush	Warren	None	Install PWBS

Source: Wilbur Smith Associates

FUTURE GROUND COMMUNICATIONS ANALYSIS

Airports with a phone or either a ground communications outlet (GCO) or a remote communications outlet (RCO) provide a valuable service to pilots. Currently, 65 percent of all system airports comply with their recommended communications objective. The following list shows which service roles have airports that do not comply with the objectives that were established to provide sufficient ground communications:

- **Regional Service Airports – Public phone, GCO or RCO**
  - Hartness State
- **Specialty Service Airports – Public phone, GCO or RCO as needed**
  - Basin Harbor
  - Fair Haven Municipal

- John H. Boylan State
- Mount Snow
- Post Mills

Table 7-11 shows the recommended ground communications objectives and needs at system airports in order to meet the future 100 percent target benchmark for this objective.

Table 7-11
Future Ground Communications Objective Analysis

Airport Name	Associated City	Current Ground Communications	Ground Communications Objectives
Regional Service			
Hartness State	Springfield	Public Phone	Install GCO or RCO
Specialty Service			
Basin Harbor	Vergennes	None	Install Public Phone
Fair Haven Municipal	Fair Haven	None	Install Public Phone
John H. Boylan State	Island Pond	None	Install Public Phone
Mount Snow	West Dover	None	Install Public Phone
Post Mills	Post Mills	None	Install Public Phone

Source: Wilbur Smith Associates

FUTURE COVERED STORAGE

Only 30 percent of all system airports currently meet the Vermont Airport System Plan's aircraft storage objective. As recommended in Chapter Five, the following hangar storage objectives were established for the four airport roles, in addition to noting those airports that do not currently meet that benchmark:

- **National Service Airports – 70% of based aircraft**
  - Edward F. Knapp State
  - William H. Morse State
- **Regional Service Airports – 70% of based aircraft**
  - Hartness State
  - Morrisville-Stowe State
- **Local Service Airports – 60% of based aircraft**
  - Caledonia County State
  - Franklin County State
  - Middlebury State
  - Newport State

It was noted in the previous chapter that if additional hangars are not provided between now and the end of the 20-year planning period, the system-wide compliance rating for the covered storage objective could decrease. An analysis was conducted to determine if airports that were currently meeting their objective would be able to accommodate the additional demand in the future by the increase in forecasted aircraft as determined in Chapter Four. Only Burlington International and Rutland State, which currently have enough hangar space, were found to also be able to accommodate future demand. The current aircraft storage facilities at Vermont's public-use airports would only allow for 20 percent of the study airports to meet their objective by the end of the planning period.

A comparison of current hangar space at all airports to the amount of space that would be required by 2025 was completed according to the forecasted increase in aircraft demand. This comparison defines the deficiency of hangar space at airports that are recommended for the construction of either T-hangars or conventional hangars as the demand increases in order to meet the 100 percent future target for this objective. This information is summarized in **Table 7-12**.

Table 7-12
Future Covered Storage Objective Analysis

Airport Name	Associated City	Current Storage (sq. ft)	Future Storage Objective (sq. ft.)	Deficiency (sq. ft.)
National Service				
Edward F. Knapp State	Barre/Montpelier	40,515	70,350	29,835
William H. Morse State	Bennington	58,800	58,300	500
Regional Service				
Hartness State	Springfield	29,300	44,100	14,800
Morrisville-Stowe State	Morrisville	25,000	33,600	8,600
Local Service				
Caledonia County State	Lyndonville	10,000	20,700	10,700
Franklin County State	Highgate	45,000	55,800	10,800
Middlebury State	Middlebury	37,300	87,000	49,700
Newport State	Newport	15,000	18,000	3,000

Source: Wilbur Smith Associates

FUTURE AIRCRAFT APRON ANALYSIS

Each airport's ability to meet the aircraft apron benchmark was discussed in Chapter Six. The system plan's objective for aircraft apron parking differs for each airport role. The following apron space objectives were established for the four airport roles:

- National Service Airports – 30% of based aircraft plus an additional 75% for transient aircraft

- Regional Service Airports – 30% of based aircraft plus an additional 50% for transient aircraft
- Local Service Airports – 40% of based aircraft plus an additional 25% for transient aircraft
- Specialty Service Airports – Maintain existing facilities

The ability of the system airports to meet this particular facility objective, both now and by the last forecast milestone (2025) is shown in **Table 7-13**. Aircraft apron needs were determined by examining each airport's current and future level of based aircraft, then applying their respective objective discussed in Chapter Five. Currently, 100 percent of system airports meet their apron objective. Applying the forecasted based aircraft and forecasted operations for each airport, it was determined that all of the system airports currently have enough apron space to accommodate aircraft parking demand throughout the planning period. It should be noted that Specialty Service airports are required only to maintain their existing facilities. As mentioned in the previous chapter, the recommended amount of apron space assumes that sufficient covered storage exists at each airport to accommodate a certain percentage of based aircraft. If the recommended amount of covered storage is not in place at system airports then an excess of based aircraft will be utilizing apron space instead for storage and as a result existing apron space will not be sufficient. This is currently the case at several of the airports where there is not enough apron to accommodate the total demand. However, as additional covered storage is provided at these airports, the existing aprons shall provide sufficient space.

Table 7-13
Future Aircraft Apron Needs Analysis

Airport Name	Associated City	Current Apron Space (sq. yd.)	Future (2025) Apron Space Objective (sq. yd.)	Deficiency
National Service				
Burlington International	Burlington	65,478	22,000	Adequate
Edward F. Knapp State	Barre/Montpelier	16,000	14,100	Adequate
Rutland State	Rutland	37,000	13,900	Adequate
William H. Morse State	Bennington	12,500	12,000	Adequate
Regional Service				
Hartness State	Springfield	25,000	4,900	Adequate
Morrisville-Stowe State	Morrisville	8,200	5,000	Adequate
Local Service				
Caledonia County State	Lyndonville	6,900	3,100	Adequate
Franklin County State	Highgate	19,000	8,900	Adequate
Middlebury State	Middlebury	15,000	8,600	Adequate
Newport State	Newport	15,000	2,800	Adequate

Source: Wilbur Smith Associates

FUTURE TERMINAL/ADMINISTRATION BUILDING ANALYSIS

Seventy percent of the airports in Vermont currently meet the study's terminal/administrative building objectives. It is targeted by the system plan that 100 percent of the system airports should meet this objective in the future. As determined from the inventory process, the following airports are in need of expansion projects to meet their terminal/administrative building objectives:

- **National Service Airports – At a minimum, 2,500 square feet of public space**
  - William H. Morse State
- **Regional Service Airports – At a minimum, 2,500 square feet of public space**
  - Hartness State
  - Morrisville-Stowe State

Airports that don't meet the objective for public space in their GA terminal/administration building are shown in **Table 7-14**. Their deficiencies are considered to be potential expansion projects.

Table 7-14
Future Terminal/Administration Building Objective Analysis

Airport Name	Associated City	Current Terminal (sq. ft.)	Terminal Objective (sq. ft.)	Deficiency
National Service				
William H. Morse State	Bennington	2,000	2,500 sq. ft.	500 sq. ft.
Regional Service				
Hartness State	Springfield	2,000	2,500 sq. ft.	500 sq. ft.
Morrisville-Stowe State	Morrisville	1,300		1,200 sq. ft

Source: Wilbur Smith Associates

FUTURE FENCING ANALYSIS

Fencing was recommended at all service levels of airports in Vermont in Chapter Five. The minimum objective was to fence the operations area at a minimum for the Local and Specialty Service roles, with the entire airport perimeter desirable for all airports. Currently, only 12 percent of the study airports meet their recommended objective. The following fencing objectives were recommended:

- National Service Airports – Entire Airport
- Regional Service Airports – Entire Airport
- Local Service Airports – Operations Area at Minimum
- Specialty Service Airports – Operations Area at Minimum

These objectives are noted to be adequate throughout the planning period. **Table 7-15** shows the current fencing at study airports that do not meet their objective and future recommendations.

Table 7-15
Future Fencing Objective Analysis

Airport Name	Associated City	Current Fencing	Fencing Objective
National Service			
Edward F. Knapp State	Barre/Montpelier	Partial	Extend Around Entire Airport
William H. Morse State	Bennington	Partial	
Regional Service			
Hartness State	Springfield	Partial	Extend Around Entire Airport
Morrisville-Stowe State	Morrisville	Partial Terminal	
Local Service			
Caledonia County State	Lyndonville	Partial	Secure Operations Area at Minimum
Franklin County State	Highgate	Partial	
Middlebury State	Middlebury	Partial	
Newport State	Newport	Partial	
Specialty Service			
Basin Harbor	Vergennes	None	Secure Operations Area at Minimum
Fair Haven Municipal	Fair Haven	None	
John H. Boylan State	Island Pond	None	
Mount Snow	West Dover	None	
Post Mills	Post Mills	None	
Shelburne	Shelburne	None	
Warren-Sugarbush	Warren	None	

Source: Wilbur Smith Associates

FUTURE AUTO PARKING ANALYSIS

Chapter Six showed that 60 percent of system airports were meeting their current auto parking objective. When future demand is taken into consideration, current parking facilities at Vermont airports are only adequate to accommodate future demand at 50 percent of the system airports. The following list shows airports that do not meet their future objective for auto parking associated with their service role:

- **National Service Airports – 1 space for each based aircraft plus 50% for employees/visitors**
    - Burlington International
    - Edward F. Knapp State
    - Rutland State
    - William H. Morse State

- **Local Service Airports – 1 space for each based aircraft plus 25% for employees/visitors**
    - Caledonia County State
    - Franklin County State
    - Middlebury State

Table 7-16 shows the airports that do not have enough automobile parking to accommodate future demand. As based aircraft increase in the Vermont Airport System, so will the demand for auto parking at these facilities. Table 7-16 lists the parking deficiencies at the airports that will require auto parking expansion projects in order for the system to meet the 100 percent future target for this benchmark as based aircraft increase.

Table 7-16
Future Auto Parking Objective Analysis

Airport Name	Associated City	Current Auto Parking Spaces	Future Auto Parking Spaces Objective (2025)	Deficiency
National Service				
Burlington International	Burlington	100	105	5
Edward F. Knapp State	Barre/Montpelier	50	101	51
Rutland State	Rutland	100	69	31
William H. Morse State	Bennington	50	84	34
Local Service				
Caledonia County State	Lyndonville	15	29	14
Franklin County State	Highgate	50	78	28
Middlebury State	Middlebury	72	73	1

Source: Wilbur Smith Associates

FUTURE FUEL ANALYSIS

Thirty-five percent of the airports in Vermont currently do not meet the study's current fuel objectives. In order to meet the established study targets for this facility and service objective, 100 percent of all airports should meet their role's recommended fuel objective. Listed below are the fuel objectives for each service role and the airports that are deficient:

- **Regional Service Airports – Self Service AvGas and Jet A**
    - Hartness State
- **Specialty Service Airports – AvGas; Jet A as needed**
    - Basin Harbor
    - Fair Haven Municipal
    - John H. Boylan State
    - Post Mills

- Shelburne

Table 7-17 lists the airports by roles that do not currently meet their fuel objective, in addition to which type of projects or facilities are recommended in order to bring the system to 100 percent future compliance for this objective.

Table 7-17
Future Fuel Needs Objective Analysis

Airport Name	Associated City	Current Fueling Facilities	Fueling Facility Objective Needs
Regional Service			
Hartness State	Springfield	Self Serve AvGas, JetA	Self Serve Jet A Capabilities
Specialty Service			
Basin Harbor	Vergennes	None	AvGas
Fair Haven Municipal	Fair Haven	None	AvGas
John H. Boylan State	Island Pond	None	AvGas
Post Mills	Post Mills	None	AvGas
Shelburne	Shelburne	MoGas	AvGas

Source: Wilbur Smith Associates

FUTURE FBO ANALYSIS

Systemwide, 76 percent of Vermont's public-use airports currently meet their Fixed Base Operator (FBO) objective. For the Vermont Airport System Plan, a full service FBO was recommended to be in place at National and Regional Service airports, while only a limited service FBO was recommended for the Local and Specialty Service roles. The following airports do not currently meet the recommended FBO services for their role:

- **Specialty Service Airports – Limited Service**
  - Basin Harbor
  - Fair Haven Municipal
  - John H. Boylan State
  - Post Mills

All of the National, Regional, and Local Service airports currently meet their FBO objective. Aviation activity at the Specialty Service airports can be very limited at times, and often does not warrant the demand for a Fixed Based Operator. While provision of FBO services is shown as an objective, each Specialty Service airport should examine its needs for these services and make an individual determination on the ability of the airport to support these services.

FUTURE AIRCRAFT MAINTENANCE ANALYSIS

Aircraft maintenance and repair is often an important service a healthy airport system can provide to its users. Currently, 90 percent of airports in Vermont report having on-site either full or limited service maintenance available dependant upon the airport's service role. There is no specific objective for Specialty Service airports to provide on-site aircraft maintenance, although any future additions would only benefit the system. It is recommended that 100 percent of the airports in the National, Regional and Local Service categories meet this objective.

Caledonia County State is the only airport that does not offer some level of maintenance. It is recommended that Caledonia County State Airport provide limited service maintenance in the future, either through their FBO or a third party.

Table 7-18 shows which airports are recommended to increase the type of maintenance services provided in order to meet the 100 percent target for this objective.

Table 7-18
Future Maintenance Objective Analysis

Airport Name	Associated City	Current Maintenance	Objective
Local Service			
Caledonia County State	Lyndonville	None Provided	Limited Service Maintenance

Source: Wilbur Smith Associates

FUTURE GROUND TRANSPORTATION ANALYSIS

By having rental cars or loaner cars available, airports help to provide another mode of transportation for their users. Currently, 70 percent of system airports meet this benchmark. It is not an objective for Specialty Service airports to provide automobile transportation. It is desirable that at a minimum, 80 percent of airports meet this objective in the future, with a desire that all airports provide this service in the future.

Table 7-19 depicts which airports do not meet their ground transportation objective.

Table 7-19
Future Ground Transportation Objective Analysis

Airport Name	Associated City	Current Ground Transportation	Ground Transportation Objective
Regional Service			
Hartness State	Springfield	None	Addition of On-Site or Off-Airport Rental Car Services
Local Service			
Caledonia County State	Lyndonville	Off-Airport Rental	Provide a Loaner Car
Middlebury State	Middlebury	Off-Airport Rental	Provide a Loaner Car

Source: Wilbur Smith Associates

BENCHMARK: PERCENT OF SYSTEM AIRPORTS IN EACH ROLE HAVING A PCI OF "GOOD" OR BETTER

Pavement preservation is essential throughout the system in order to maintain the functionality of the airports and to minimize long-term pavement reconstruction costs. The Vermont Airport System Plan has identified a pavement condition of "good" as reported by the FAA 5010 as an objective for all paved primary runways and currently 75 percent of all system airports meet this benchmark. An 85 percent future target for this service objective was established for airports to have adequate PCI ratings, with 100 percent compliance desirable. In order to bring the three airports that have runways rated by the FAA 5010 as less than "good," projects such as runway overlays or minor rehabilitations are recommended dependant upon the actual physical condition of each runway. The following airports do not currently meet the PCI objective:

- **National Service Airports**
  - William H. Morse State
- **Regional Service Airports**
  - Morrisville-Stowe State
- **Specialty Service Airports**
  - Mount Snow

It should be noted that airports that have grass strips were not included in this objective. **Table 7-20** lists the airports that do not meet this objective and are recommended for runway projects.

Table 7-20
Future Pavement Condition Objective Analysis

Airport Name	Associated City	Current PCI	Recommendation
National Service			
William H. Morse State	Bennington	Fair	Overlay or Rehab
Regional Service			
Morrisville-Stowe State	Morrisville	Fair	Overlay or Rehab
Specialty Service			
Mount Snow	West Dover	Fair	Overlay or Rehab

Source: Wilbur Smith Associates

Mount Snow is a privately owned airport, which places the costs of projects such as pavement maintenance and runway overlays directly on the owner/operator. These types of projects at privately owned airports are not eligible for FAA funding. As a result, it is recommended that William H. Morse State and Morrisville-Stowe State improve their PCI condition at a minimum, in order to meet the 85 percent future target for this objective. Both of these airports have been recommended in an earlier section to extend and thus strengthen their runway. If these recommended projects are implemented, the runway PCIs would be increased to a level that would meet and or exceed the "good" rating. In addition, other projects such as runway maintenance will be required at other airports throughout the planning period in order to keep the system in compliance with the 85 percent target for this objective.

VTrans has implemented an extensive pavement management program to ensure the viability of its airport pavements at the State-owned airports. In addition to this program, publicly owned airports that accept FAA funding are required to have a pavement management program. While the issue of pavement condition is a long-term concern, there are programs in place to monitor pavement conditions and hopefully implement short and long-term projects to maintain the State's airport pavements.

BENCHMARK: PERCENT OF SYSTEM AIRPORTS IN EACH ROLE HAVING AN AIRPORT LAYOUT PLAN (ALP) UPDATED IN THE LAST 10 YEARS

The Vermont Airport System Plan recommends that all system airports have current planning documents. It is recommended that each airport's airport layout plan (ALP) be updated every 10 years in order to stay current and up to date on system needs and desired projects. Currently, only a few airports in the Specialty Service role do not have a current ALP. Three of these airports have grass strips and do not warrant the need for an ALP. It is recommended that all National, Regional, and Local Service airports update their ALPs every 10 years. Several airports are currently in the process of updating their plans.

Table 7-21 provides recommendations for updating ALPs for all system airports over the next 20 years. Local conditions and needs could dictate whether the recommended schedule is too aggressive or not aggressive enough. The need to update an airport master plan or ALP should be determined by the local airport owner in conjunction with VTrans and the FAA.

Table 7-21
Future ALP Update Objective Analysis

Airport Name	Associated City	Date of Current ALP	Recommended ALP Update
National Service			
Burlington International	Burlington	2004	2014 & 2024
Edward F. Knapp State	Barre/Montpelier	2000	2010 & 2020
Rutland State	Rutland	2006	2016
William H. Morse State	Bennington	2005	2015 & 2025
Regional Service			
Hartness State	Springfield	2003	2013 & 2023
Morrisville-Stowe State	Morrisville	2005	2015 & 2025
Local Service			
Caledonia County State	Lyndonville	2000	2010 & 2020
Franklin County State	Highgate	2005	2015 & 2025
Middlebury State	Middlebury	2003	2013 & 2023
Newport State	Newport	1999	2009 & 2019
Specialty Service			
Basin Harbor	Vergennes		As Needed
Fair Haven Municipal	Fair Haven	2004	2014 & 2024
John H. Boylan State	Island Pond	2003	2013 & 2023
Mount Snow	West Dover		As Needed
Post Mills	Post Mills		As Needed
Shelburne	Shelburne		As Needed
Warren-Sugarbush	Warren		As Needed

Source: Wilbur Smith Associates

BENCHMARK: PERCENT OF SYSTEM AIRPORTS IN EACH ROLE HAVING LOCAL AIRPORT-RELATED ZONING

Ideally, all municipalities that have land use authorities and that border the existing 17 public-use airports in Vermont should take action to promote land use that is "airport friendly" by having airport-related zoning in place. Information for this benchmark was obtained from the 10 Regional Planning Commissions that are responsible for planning-related tasks around each of the airports. Currently, 53 percent of all system airports report having airport-related zoning in place either on or around airport property within their communities. It is desired that all airports meet this objective in the future for 100 percent future target compliance. Airports recommended to work with their local municipalities to obtain airport-related zoning are shown in **Table 7-22**.

Table 7-22
Airports Recommended for
Local Airport-Related Zoning

Airport Name	Associated City
National Service	
Edward F. Knapp State	Barre/Montpelier
Regional Service	
Hartness State	Springfield
Local Service	
Newport State	Newport
Specialty Service	
Basin Harbor	Vergennes
Fair Haven Municipal	Fair Haven
John H. Boylan State	Island Pond
Post Mills	Post Mills
Shelburne	Shelburne

Source: Wilbur Smith Associates

As mentioned in the last chapter, some municipalities may have adopted zoning that is "airport friendly" and promotes safety around their associated airports, although due to variances or conditional uses, actual land coverage around the airports may not be compatible or consistent with the adopted zoning.

BENCHMARK: PERCENT OF SYSTEM AIRPORTS IN EACH ROLE THAT ARE INCLUDED IN REGIONAL LAND USE PLANS THAT INCLUDE AIRPORT-COMPATIBLE LAND USES IN THE AIRPORT ENVIRONS

Vermont's airports should ideally have surrounding municipalities that have adopted land use controls to make the land use in the airport environs compatible with the airport and its operation. Within the context of the system evaluation presented in the previous chapter, the current compliance rating for this benchmark was based on data supplied by the Regional Planning Commissions (RPCs). According to the RPC's reported data, 76 percent of all system airports have municipalities that have adopted compatible land use guidelines and recognize the airports in the comprehensive plans and in some instances transportation plans. The future target is to have 100 percent of the municipalities in Vermont that host airports adopt compatible land use guidelines for their airports. Ideally, all system airports should be recognized in their local or regional comprehensive plans. **Table 7-23** shows which airports are recommended to work with the regional and local planning authorities to adopt compatible land uses around the airport environs.

Table 7-23
Airports Recommended to be Included in Regional Land Use Plans with Compatible Land Uses in the Airport Environs

Airport Name	Associated City
Specialty Service	
Basin Harbor	Vergennes
Mount Snow	West Dover
Post Mills	Post Mills
Shelburne	Shelburne

Source: Wilbur Smith Associates

PERFORMANCE MEASURE: SAFETY AND SECURITY

A third goal established by the Vermont Airport System Plan was to provide a safe and secure system of airports. As part of the safety and security performance measure, the number of system airports that met objectives related to addressing safety and security concerns was to be determined. The following benchmarks were established:

- Percent of system airports in each role that meet applicable FAA airport design standards
- Percent of system airports in each role that meet applicable VTrans or TSA security-related recommendations

As mentioned in the previous chapter, VTrans is currently undergoing an evaluation of the safety and security of the public-use airports in Vermont. Once the current compliance with FAA airport design standards of all public-use airports is determined, it is recommended that all airports that are deficient in meeting any of the standards be developed as to promote a safe airport environment. Conclusively, it is recommended that all system airports be 100 percent compliant with any and all objectives set forth by VTrans and by those of the TSA related to airport security.

DEVELOPMENT COSTS

Vermont's public-use airports have been analyzed for current and future compliance with the recommended facility and service objectives for each of the four service roles. Previous sections of the chapter have identified the deficiencies of airports that do not meet the various facility and service objectives. Projects to address these deficiencies have been identified for each airport. In addition, to portray the total needs of Vermont's airport system, projects from airport master plans and capital improvement plans have been included in the project listing for use by VTrans.

It is important to note that the recommendations and costs contained in this chapter are a result of a comprehensive statewide analysis, and are not intended to replace airport-specific recommendations that may result from more detailed airport master planning. The recommendations contained in this chapter are intended to provide VTrans and the State of Vermont with guidance on the types of projects that could be implemented to improve upon the deficiencies and bring the 17 public-use airports into compliance with the facility and service objectives that were developed in earlier chapters of the Vermont Airport System Plan.

The recommended projects are subject to detailed review in an airport master plan. Furthermore, any recommended projects involving federal funding could be subject to an environmental assessment (EA) and possibly an environmental impact statement (EIS). Typically, projects involving the addition or modifications to runways and taxiways yield an EA, and if required by the FAA, an EIS. As a result, these will be included in the overall recommended projects where appropriate.

Several of the recommended projects for Vermont's system airports have already been identified and planned for in specific master plans and/or have been included in VTrans Five-year Capital Improvement Project (CIP) list for its airports. These specific projects are noted in the individual project lists for each airport. It should be noted that in most cases the recommendations of the System Plan may not be exactly that of a previous master plan or the current CIP, but are similar regarding the type of project, whether it be a runway extension or providing covered storage.

With development of a capital plan for each of Vermont's airports, an analysis of the system's financial needs can be accomplished. (Individual capital plans for each airport are presented in **Appendix E**.) **Table 7-24** presents a summary of the total projected costs of the projects from both the System Plan and airport master plan/capital improvement plans, with an estimate of the funding eligibility of the total need by federal, State, and local resources. **Exhibit 7-1** shows that of the total capital needs identified in this study ($178.8 million), approximately 85 percent of the needs are eligible for federal funding, nearly 11 percent would need to be funded by the State, and the remaining 4 percent would come from local resources.

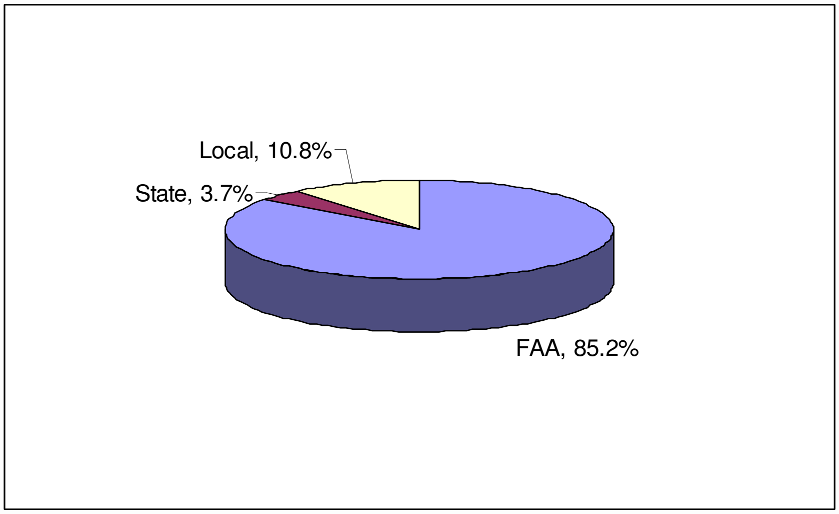
When the capital needs are evaluated by system role, it is clear that the majority of the project needs are at the National Service airports with nearly 83 percent of the total costs (see **Exhibit 7-2**). With only two airports, the Regional Service projects comprise only 5 percent, while the four Local Service airports comprise 8 percent of the total costs. While the Specialty Service airports include eight airports, their costs represent only 4 percent of the total due to their limited activities and need for projects.

Table 7-24
Total Systemwide Capital Needs

Classification/		Funding Source		
Airport	**Total**	**FAA**	**State**	**Local**
National Service				
Burlington International	$120,266,000	$100,545,150	$3,175,110	$16,545,740
Edward F. Knapp State	$7,475,425	$7,054,154	$421,271	$0
Rutland State	$10,669,750	$10,136,263	$533,488	$0
William H. Morse State*	$9,030,500	$8,578,975	$451,525	$0
Regional Service				
Hartness State	$3,281,500	$3,117,425	$164,075	$0
Morrisville-Stowe State	$6,296,813	$5,981,972	$314,841	$0
Local Service				
Caledonia County State	$5,179,000	$4,540,050	$438,950	$0
Franklin County State	$3,118,000	$2,962,100	$155,900	$0
Middlebury State	$3,641,000	$3,458,950	$182,050	$0
Newport State	$2,840,000	$2,413,000	$427,000	$0
Specialty Service				
Basin Harbor	$116,000	$0	$0	$116,000
Fair Haven Municipal	$3,631,000	$3,449,450	$108,930	$72,620
John H. Boylan State	$578,500	$0	$228,500	$0
Mount Snow	$1,796,000	$0	$0	$1,796,000
Post Mills	$116,000	$0	$0	$116,000
Shelburne	$115,000	$0	$0	$115,000
Warren-Sugarbush	$634,375	$0	$0	$634,375
Total Costs	**$178,784,863**	**$152,237,488**	**$6,601,639**	**$19,395,735**

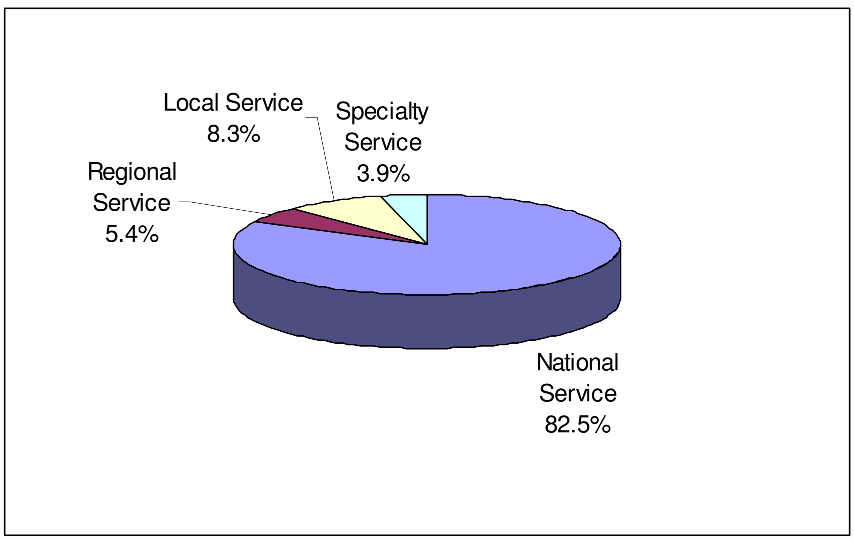
Source: VTrans, Airport personnel, Wilbur Smith Associates

Exhibit 7-1
Total Systemwide Capital Needs – By Eligible Funding Source



Source: VTrans, Airport personnel, Wilbur Smith Associates

Exhibit 7-2
Total Systemwide Capital Needs – By Airport Role



Source: VTrans, Airport personnel, Wilbur Smith Associates

When examined at the project level by airport role, the type of projects needed at the various airports indicates where the greatest needs are. **Table 7-25** shows the projects needed at the National Service airports by project type. As shown, land acquisition, taxiway development, and storage account for 63 percent of the total project needs at National Service airports as identified through the System Plan and airport master plans/capital improvement plans. In total, approximately $147.4 million is needed to complete the projects identified for the three National Service airports over the planning period.

Table 7-25
National Service Projects by Type

Type of Project	Total Need	% of Total Need
Parking	$2,445,000	2%
Storage	$26,718,425	18%
Obstruction Removal	$6,150,000	4%
Land Acquisition	$34,500,000	23%
Runway	$11,502,500	8%
Taxiway	$32,241,250	22%
Apron	$18,100,000	12%
Terminal Area	$9,249,500	6%
Lighting/NAVAIDS/Weather/Ground Communications	$4,185,000	3%
Planning	$1,850,000	1%
Equipment/Fencing/Fuel	$500,000	0%
TOTAL COST	**$147,441,675**	**100%**

Source: VTrans, Airport personnel, Wilbur Smith Associates

Comparatively, as shown in **Table 7-26**, at the Regional Service airports the majority of the costs are in the runway, taxiway and storage categories, which account for 75 percent of the total costs for these two airports. The two airports in the Regional Service category have projects totaling approximately $9.6 million during the planning period.

Table 7-26
Regional Service Projects by Type

Type of Project	Total Need	% of Total Need
Parking	$0	0%
Storage	$1,287,000	13%
Obstruction Removal	$430,000	4%
Land Acquisition	$150,000	2%
Runway	$3,191,313	33%
Taxiway	$2,812,500	29%
Apron	$0	0%
Terminal Area	$212,500	2%
Lighting/NAVAIDS/Weather/Ground Communications	$225,000	2%
Planning	$780,000	8%
Equipment/Fencing/Fuel	$490,000	5%
TOTAL COST	**$9,578,313**	**100%**

Source: VTrans, Airport personnel, Wilbur Smith Associates

The four airports in the Local Service category were noted to need approximately $14.8 million in projects (see **Table 7-27**). Of this total need, a great majority falls in the runway category at 63 percent. Besides runway projects, storage and planning were identified as necessary projects at the Local Service airports.

Table 7-27
Local Service Projects by Type

Type of Project	Total Need	% of Total Need
Parking	$43,000	0%
Storage	$1,750,000	12%
Obstruction Removal	$0	0%
Land Acquisition	$0	0%
Runway	$9,245,000	63%
Taxiway	$1,000,000	7%
Apron	$0	0%
Terminal Area	$0	0%
Lighting/NAVAIDS/Weather/Ground Communications	$930,000	6%
Planning	$1,410,000	10%
Equipment/Fencing/Fuel	$400,000	3%
TOTAL COST	**$14,778,000**	**100%**

Source: VTrans, Airport personnel, Wilbur Smith Associates

The Specialty Service airports consist of seven airports that serve varying roles in Vermont's airport system. Most of the airports in the Specialty Service category are privately owned and are not currently eligible to apply for federal or State funding to meet their projected needs, although one is State-owned and one is municipally owned. Of the nearly $7 million in projects at the Specialty Service airports, 84 percent is needed for runway projects including a new paved runway and an overlay of another runway. It is important to note again that many of these projects must be funded locally, either through the municipality or the private owner.

Table 7-28
Specialty Service Projects by Type

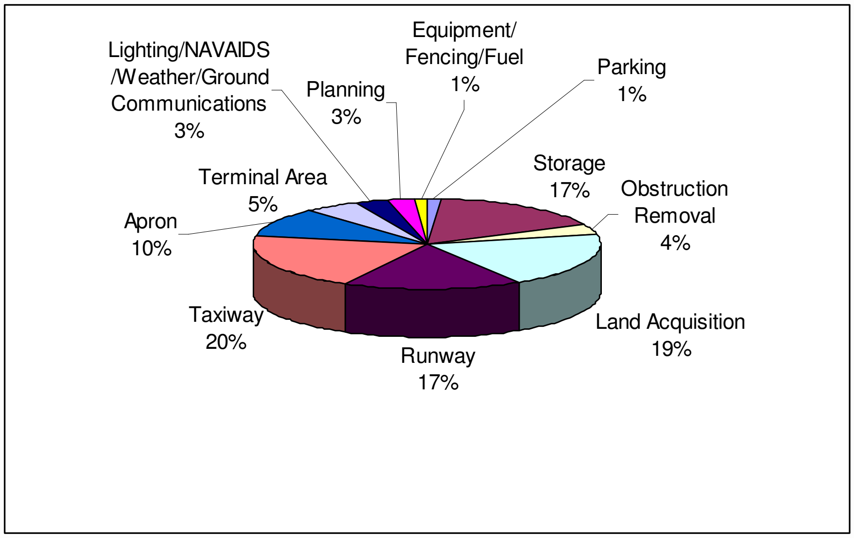
Type of Project	Total Need	% of Total Need
Parking	$0	0%
Storage	$0	0%
Obstruction Removal	$0	0%
Land Acquisition	$0	0%
Runway	$5,869,375	84%
Taxiway	$150,000	2%
Apron	$0	0%
Terminal Area	$0	0%
Lighting/NAVAIDS/Weather/Ground Communications	$40,000	1%
Planning	$440,000	6%
Equipment/Fencing/Fuel	$487,500	7%
TOTAL COST	**$6,986,875**	**100%**

Source: VTrans, Airport personnel, Wilbur Smith Associates

When the projects are examined at the Statewide level (see **Exhibit 7-3**), the needs are more evenly divided between taxiway (20 percent), land acquisition (19 percent), runway (17 percent), and storage (17 percent).

The analysis of the State's capital needs from this statewide perspective should be considered in future funding scenarios in which priorities and programming are established.

Exhibit 7-3
Statewide Projects by Type



Source: VTrans, Airport personnel, Wilbur Smith Associates

SYSTEMWIDE RECOMMENDATIONS

The recommendations developed for the Vermont Airport System are a result of a comprehensive analysis of each system airport's needs based on the recommendations of the System Plan. While each airport's deficiencies and recommendations differ, there are several recommendations on a systemwide level that are essential for the longevity and development of all 17 of Vermont's public-use airports. These recommendations should be carried out continuously as needed throughout the 20-year planning period. The systemwide recommendations include updating and maintaining the following existing VTrans studies and systems:

- Airport Information Management System (AIMS)
- Airport Pavement Management System (APMS)
- Economic Impact Analysis

In order for an airport system to run efficiently and be developed properly, it is critical that the existing infrastructure is maintained and expanded upon. In order to do so, VTrans currently uses an Airport Information Management System (AIMS) to keep track of airport data including facilities, activity, and grants. An extensive update of this system has been developed, with the new system referred to as Airport IQ. The Airport IQ system utilizes a web-based platform to provide a basis for maintaining and updating airport information. VTrans is currently examining funding options for the Airport IQ system. If and when implemented, this system will provide a means of monitoring the system's performance as identified in the Vermont Airport System Plan. Each of the performance measures developed in this analysis can be included in the Airport IQ system such that when projects or conditions change at Vermont's airports, the performance measure can be updated. For example, if a runway extension project is completed, the airport's runway length can be changed and the ability of that airport and the system to meet the target performance measures can be calculated. This provides a method for determining how investments in Vermont's airport system are leading to improved performance of the overall system.

Pavement at an airport is a valuable part of infrastructure as it relates to runways, taxiways, and the aircraft apron. In order to maintain good pavement conditions and extend the useful life of existing infrastructure, the existing Airport Pavement Management System (APMS) is recommended to be maintained and monitored throughout and beyond the 20-year planning period. The current VTrans APMS examines only the State-owned airports, while the other publicly owned airports are required to maintain their own programs. Pavement management projects are included in the VTrans 5-Year CIP for the State-owned airports such that these projects are programmed to ensure the viability of these pavements. The privately owned airports are not required to evaluate their pavement conditions, nor does VTrans currently assist in this evaluation or monitoring process.

The final recommendation on a system wide level is to update the Economic Impact Study of Vermont's Public-use Airports. This study was completed in April of 2003, and summarizes the significant economic value that aviation activity conducted at Vermont's public-use facilities brings to the State. Economic Impact Studies help to educate the State's residents, businesses, and government leaders on how valuable the investment and maintenance of Vermont's 17 public-use airports are and the positive impacts that aviation brings to the State. It is recommended that the Economic Impact Study be updated at regular intervals, typically every five to seven years.

Chapter Eight: Policy Plan

ROLE, VISION AND MISSION FOR AVIATION

Vermont's airport system is an integral component of the State's transportation network. The airport system supports aviation and economic demands and links Vermont to the national transportation system. Aviation provides an important and efficient means of transportation for the movement of people and goods. The vision for the Vermont airport system is to have safe, quality, and up-to-date facilities and services that support existing transportation demand; meet the access, economic development and quality of life needs in the State; and develop to respond to the new technologies in the aviation industry.

The Vermont Airport System and Policy Plan uses a strategic approach to identify and evaluate the needs of the Vermont airport system over the next 20 years. The primary goal of the System Plan is to provide a framework that supports informed decisions related to planning and developing the State's aviation system, considered a significant asset to the State. These decisions play an important role in assisting the Airport System to meet Vermont's needs.

The Policy Plan uses the framework developed for the System Plan, which analyzed the airports' roles and needs, and recommends policies to promote the long-term viability and effectiveness of the airport system.

It is important to note that the Airport System and Policy Plan was recognized as an important document when the Vermont Aviation Advisory Council was established by Governor Douglas in August 2003.[1] The Council was charged with the following responsibilities according to the Executive Order:

- Recommending an aviation policy for Vermont
- Recommending an investment program for Vermont airports
- Recommending airport classifications
- Recommending air project priorities
- Recommending actions to enhance the linkage between Vermont's aviation industry and the State's economic vitality
- Serving as a forum for aviation-related issues, including policy makers, aviation industry representatives, airport users, and others
- Encouraging cooperative relationships between the Agency of Transportation and airport business operators

Many of these responsibilities have been addressed through previous work and the conduct of the Airport System and Policy Plan which has been an integral sounding board for the interim findings of the Plan. Once adopted, the Airport System and Policy Plan will serve as the framework for the Agency's and Council's future efforts.

ROLE OF AVIATION IN VERMONT

Vermont's system of airports serves a diverse range of activities from commercial airline service to recreational flying to transporting cargo. These activities are governed by the U.S. Department of Transportation (US DOT), primarily through the Federal Aviation Administration (FAA). While FAA governs the development at airports, the airspace that airplanes utilize, and aircraft ownership, the land that airports sit on also fall under the governance of local jurisdictions as it relates to environmental issues, land use, and access to the airports. This governance creates a multi-layered approach to airport operation and development, requiring significant coordination and communication among the various entities. Vermont is also the owner/operator of 10 of the State's airports. While serving as the owner/operator, the State coordinates with the local communities which the airports serve related to environmental, land use, and access issues.

[1] There is another council organized in Vermont prior to the establishment of this council in 2003. It is recommended that the council established in 2003 be renamed the Governor's Advisory Council on Aviation (GACA) or another name to differentiate this council from the one that existed prior to 2003.

As a key component of the State's transportation infrastructure, the Vermont Airport System's role is to provide access to the national air transportation system. The Vermont Airport System should serve to:

- Provide access from both the ground and the air
- Preserve and enhance existing infrastructure (asset) investments
- Promote a safe and secure system of airports
- Support economic activity throughout the State
- Integrate with the local, regional, and national transportation systems
- Prepare for future transportation needs through new technology
- Promote aviation education
- Promote compatible land use
- Promote health, safety, and emergency services

VISION OF VERMONT'S AIRPORT SYSTEM

Each of Vermont's airports serves a unique role in the State system. While each airport serves its own local or regional marketplace, together, the State's airports fulfill an important role in connecting Vermonters to the national and international air transportation system, while also providing access for business and other visitors to Vermont. Airports are used to transport persons and freight in a timely manner, providing the quickest form of transportation. With this in mind, the vision for the Vermont airport system has been defined as:

> "Vermont's airport system will be accessible, safe and secure, meeting the needs of its business and recreational users, including implementing new technologies to support the future system. The airport system will be preserved and enhanced, while meeting Federal and State guidance and promoting responsible environmental stewardship and land use compatibility. Vermont's airports will be operated as business-oriented facilities focusing on creating opportunities for a return on the investment and will provide intermodal linkages to national transportation systems."

In order for Vermont's airport system to meet this vision, goals and policies need to be established and implemented.

AVIATION MISSION FOR THE AGENCY OF TRANSPORTATION

The Vermont Agency of Transportation's aviation mission is to support, maintain and enhance the 10 State-owned airports. As the owner/operator of 10 State-owned airports, VTrans promotes efficient and effective operation of its airports to assure safe, secure, and reliable air transportation of goods and people, while being environmentally responsible, cost-effective and supportive of Vermont's economy and recreational activities. Emergency services, aviation education, financial responsibility, and promotion of compatible land use are part of the mission for VTrans, as is playing a supportive role to all airports and aviation statewide.

VTRANS AVIATION GOALS

As part of the Airport System Plan, goals and associated performance measures were identified to guide Vermont's airport system development and establish the framework for the Plan. These goals have been supplemented by additional goals related to policy decisions that impact the maintenance and development of Vermont's airport system. The following goals will be sought to accomplish the mission of the airport system (not intended to be listed in priority order):

- Provide a system of airports that is accessible for people and goods from both the ground and the air throughout the State.

- Provide intermodal ground access opportunities and/or services such as rental car, taxi, bus, or bike.

- Preserve and enhance Vermont's existing airport system's infrastructure investment through maintenance and rehabilitation to meet future growth and demand as well as providing new infrastructure to meet future needs in support of the national air transportation system when needed.

- Plan for future airport development and protect public investment in airports through promotion of compatible land use in the vicinity of airports.

- Provide a safe and secure system of airports that meets State and Federal guidelines, including routine inspections of airports such as the 5010 Program.
- Seek adequate and stable funding, including FAA assistance, and assure appropriate staffing to support the Agency's mission.

- Make timely, sound infrastructure investments derived from airport master plans and based on priorities that are determined through coordination with

Vermont's aviation stakeholders, including use of the Vermont Airport Capital Facilities Program.

- Maintain commercial air service at Rutland State Airport and support its development elsewhere in the State, as well as encourage additional commercial and cargo services where appropriate.

- Maintain an up-to-date integrated database of air and landside facilities including capital plans and improvements, leaseholds, contacts, relevant zoning as well as the system's performance measures.

- Strive to generate appropriate revenues from the operation of the State-owned airports in support of their continued operation and expansion utilizing a business-oriented approach.

Current Aviation Policies

The current policies related to airport development in Vermont focus on meeting FAA standards while accommodating demand for aviation, serving air transportation needs, and supporting economic growth and development. The policies and procedures currently in place primarily address Vermont's airport funding. These policies, as identified in the 1998 Air Policy Plan included:

1. Procedures in Vermont are such that available State aviation funds are invested exclusively on the 10 State-owned airports, plus Burlington International.
2. State policy is to keep all 10 State-owned airports open and safe.
3. State funding priority is given to the matching of available federal funds.
4. State policy is to provide resources necessary to operate and maintain the State-owned airports.
5. State policy is to support federal passenger Essential Air Service subsidies at Rutland State Airport.
6. Decisions concerning the magnitude of funds to be made available for airports are the responsibility of the Vermont Legislature.
7. The State transportation funding program is subdivided into 14 separate programs, one of which is devoted to aviation.
8. The Vermont Agency of Transportation is an advocate for the promotion of aviation and airports.
9. Funding decisions are made utilizing established federal priorities and criteria but without the use of an explicit set of state criteria and without an explicit state prioritization process.

10. State policy appears to be to provide an absolute minimum project funding for the 10 State-owned airports.

Some of these policies relate to the goals established in the previous section, while other policies address funding. None of the policies address operational issues, organizational structure, or standards for the airport system.

In 2000, VTrans completed the Vermont Airport Capital Facility Program. This study included development of an Airport Project Prioritization System for analyzing airport projects in the State but did not address other policy-related issues. The Project Prioritization System recommended in the 2000 study set four major goals for the system:

- Make the best possible use of limited financial resources
- Preserve the existing aviation system
- Bring airports into compliance with FAA and VTrans standards
- Enhance economic development for the adjacent communities

The system was divided into airport and project criteria. Factors within each of these criteria included the following:

Airport Points
Airport Operations
Based Aircraft
Geographic Proximity
Governmental Support

Project Points
Economic Development
Special Program/Multi-Year
Project Type
FAA Priority Points
Upgrade to Standards
VTrans Development Standards
Previous Programmed Federal/State Aid
Cost/Benefit (Projects <$75,000)
Resource Impact
Local Interest and Support

This system has been used implicitly in funding decisions, but in its current format does not provide a means to monitor, track and evaluate the status of projects including grant status.

Recommended Aviation Policies

In order for the Airport System and Policy Plan to be effective, policies must be established that relate the goals of the aviation system to implementation strategies. Goals were used explicitly throughout the Airport System Plan to derive recommendations related to future airport needs and development of an integrated, comprehensive, technologically advanced, and sound capital development plan. These goals and the performance categories described in the Policy Plan are synonymous.

Based on the role, mission, and vision for Vermont's aviation system, as well as the evaluation of the performance of the system relative to the performance measures and review of the previous policies, the following aviation policies are recommended for VTrans:

It is State Policy to:

1. Advocate for the promotion of aviation and airports, including education of youth and flight training to promote sustainability in Vermont's aviation industry.
2. Maintain all 10 State-owned airports in order to keep them open and safe.
3. Maintain adequate access to public-use commercial and general aviation airports for all areas of Vermont.
4. Promote generating appropriate revenues from the operation of State-owned airports utilizing a business-oriented approach.
5. Promote development of facilities at State-owned airports in response to demand including tie-down areas and hangars, including associated surface access and utilities either with State or private funding.
6. Implement an updated computerized Airport Management System such as Airport IQ consistent with the Strategic Enterprise Initiative that is based on achieving the performance targets set for the aviation system, with a high priority given to the matching of available federal funds.
7. Support federal passenger Essential Air Service subsidies at Rutland State Airport and continued growth of passenger service at Burlington International Airport and encourage new passenger service development such as charter and other services through marketing and promotion.
8. Promote compatible land use near airports.
9. Utilize an asset management approach to ensure appropriate maintenance and investment in existing airport assets.
10. Seek adequate and stable funding and resources from all available sources to support the State's goals, mission and policies.
11. Promote airports as economic generators and catalysts.

12. Promote establishment of a statewide airports council to provide a forum for Vermont's airport operators, both public and private, to discuss current issues, activities, and processes to assist in enhancing Vermont's airport system.
13. Evaluate and seek changes to plans and facilities to respond to new technology and aircraft fleets to accommodate future air transportation system needs.
14. Encourage private use airports to consider transition to public use, if appropriate.

Aviation Performance Categories and Measures

Performance categories are developed to provide an organizational method of relating the goals that have been identified for Vermont's airport system to appropriate measures. Measures are then developed to evaluate how the system is performing related to that performance category and what future performance level should be targeted. The performance categories for Aviation are:

- Accessibility
- Development
- Safety and security
- Funding and economics
- Maintenance

Performance Category: Accessibility

Goals of Vermont's aviation system are to provide a system of airports that is accessible from both the ground and the air, as well as a system that serves all areas of the State. This includes population coverage as well as coverage of the land area within the State.

Ground accessibility can be measured by determining the coverage that system airports provide to all geographic areas of the State. The FAA standard of 30 minutes between National Plan of Integrated Airport Systems (NPIAS) airports is used in the Vermont Airport System Plan to identify the percent of the State's population that is within a 30-minute drive time of various types of system airports and facilities. Accessibility to airports that provide coverage for a full range of the corporate/business general aviation fleet is an important system characteristic. Airports with runways of 5,000 feet or more can provide this accessibility by accommodating larger aircraft, such as corporate and regional jets, which smaller general aviation airports cannot accommodate.

Air accessibility is also an important factor in measuring system performance. Airports that are equipped and capable of supporting operations in all weather conditions promote a system's air accessibility. Accessibility to airports from the air is increased by the presence of landing systems that enable aircraft to locate airports during periods of reduced visibility. System airports that have a precision approach offer the highest degree of accessibility, and airports with a non-precision approach provide a higher degree of accessibility from the air than do airports that are served only by a visual approach.

PERFORMANCE CATEGORY: DEVELOPMENT

Significant investment has been made in the existing infrastructure of Vermont's airports, both from the public side including the FAA and VTrans, as well as by private entities. While much of Vermont's airport system is publicly owned, the State does have several privately owned airports that are subject to closure if the owners so choose. These private owners are also typically not eligible to receive public funding and must develop and maintain their facilities on their own. Future development of Vermont's aviation system should be directed to preserve, protect, and enhance existing airport infrastructure to ensure its longevity, whether privately or publicly owned.

A good airport system should be adequately planned and developed to provide airside and landside infrastructure and facilities to meet both current and future demand. Planning needs to go beyond the airport boundaries into the communities that surround the airports. This planning includes providing timely analyses related to airport needs and updating plans on file with the FAA regarding future projects, and coordinating with regional agencies to ensure controls are in place to protect the airport and its airspace to promote safe operations.

As part of the Vermont Airport System Plan, system airports have been reviewed relative to facility and service objectives identified for their respective airport functional role category. Of these facility and service objectives, those pertaining to runway length and width, taxiway type, approach to the airport from both the ground and air, and fuel service are important considerations in the ability of Vermont's airport system to meet corporate aviation needs. Established objectives for airfield pavement conditions for optimal use and safety are used in the Vermont Airport System Plan to evaluate the adequacy of the airport system as it relates to proper development and maintenance of airfield pavements.

Planning for future airport development and the ability to protect public investment in airports by controlling development around airports are important. Airports need to proactively plan for future development and implement land use planning guidelines to protect them from the encroachment of activities or land uses that are incompatible with their day-to-day operations. Proper planning on and around system airports generally increases their ability to respond to development needs and allows for appropriate surrounding land use.

PERFORMANCE CATEGORY: SAFETY AND SECURITY

A third performance category considered in this analysis is to provide a safe and secure system of airports. Standards have been established by the FAA related to airport design to provide safe and effective aviation facilities for airports based on the types of aircraft operating or projected to operate at the airports. These standards are evaluated by the FAA as part of airport project funding requests to the FAA. In addition to FAA standards, the TSA has established guidelines and regulations for airports depending on the type of operators. VTrans is currently working on security guidelines and recommendations for airports in the system based on TSA guidance. Finally, as the owner of 10 airports in the State, VTrans must ensure that FAA requirements are met related to grant assurances made by VTrans on behalf of the airports. These requirements include safety inspections on a monthly basis.

PERFORMANCE CATEGORY: FUNDING AND ECONOMICS

All of Vermont's airports provide support to the State's economy. Many of the airports are used by businesses to transport people and goods, but are also economic generators themselves. Typically, the largest economic generators are commercial airports that have airline service. Vermont currently has only two commercial service airports, Burlington and Rutland. While Burlington continues to experience growth in airline service, Rutland participates in the federal Essential Air Service (EAS) subsidy program. The continuation of EAS service at Rutland is based on federal funding for this program which is at risk due to Federal funding constraints. Maintenance of this program or significant growth in airline and passenger activity at Rutland State Airport will be required for the airport to continue serving commercial airline service.

In order for the Vermont Airport system to continue to support the economy Sand serve as a link to other transportation networks, continued investment must be made in the system. The Airport System Plan and previous Capital Facilities Plan have identified the needs of Vermont's airports to meet FAA standards and State facility objectives. These needs reflect projects of all types including those that are necessary to meet safety deficiencies, enhance capacity of the system, accommodate demand, and maintain pavements and buildings. While FAA funding can be sought for many of the projects, there will also be a need for funding to match grants and meet other non-FAA eligible project needs. The Capital Facilities Plan included development of an Airport Project Prioritization System to assist in determining the capital improvement plan for Vermont's airports. Maintenance and update of the Project Prioritization System is needed and planned through the implementation of an updated management system (Airport IQ) that will provide VTrans with additional capabilities related to tracking and monitoring grants, as well as other features consistent with the Strategic Enterprise Initiative recently instituted.

Unlike many other state transportation systems, 10 of Vermont's airports are owned and operated by the State. The State has contracted with private individuals to serve in management, oversight, and facility operation roles at these airports, ensuring rules and regulations are adhered to and that appropriate services are provided at the airports. However, the State still has resource needs to ensure compliance, seek and monitor project funding, and manage the aviation assets. In addition to overseeing the 10 State-owned airports, VTrans staff are also responsible for maintaining the airport facilities; managing the state and federal grant programs; managing the project development process; administering, monitoring, and evaluating the leases at the State-owned airports; licensing privately owned airports; issuing permits for activities such as air shows; aircraft accident investigations; disaster recovery assistance; emergency services; and management of the State-owned airplanes including providing the aircraft and staffing for aircraft use by other state agencies.

PERFORMANCE CATEGORY: MAINTENANCE

Maintenance of the existing airport system is the final performance category. With a high level of investment in the existing airport system and a significant amount of infrastructure, it is critical that maintenance of the system is considered in the evaluation of the performance. In this category, maintenance relates to information on the system, operation of the State's airport management function, and coordinating the applications, usage, monitoring and closeout of grants. The State previously developed an Airport Information Management System (AIMS) to serve as an in-house resource for airport data including facilities, activity, and grants. This system has not been updated to reflect more current technology that allows for web access and additional features including performance measurement tracking. This system could also be used to monitor lease agreements that are in place with tenants at the 10 State-owned airports. These lease agreements have been developed over the years without a consistent, written process in place to evaluate their effectiveness. It is important that these leases be reviewed, tracked, and evaluated on a recurring basis to ensure their appropriateness towards making the airports operate in a business-oriented manner. In that same consideration, grants that have been obtained to develop the airports need to be tracked and monitored to ensure that closeouts are made, therefore completing the grant cycle process.

Aviation Performance Measures and Targets

Performance measures and targets for the different performance categories have been developed to evaluate the aviation system. It is important to note that there are several measures that can be used to evaluate progress on the goals established for the aviation system and several goals that may relate to the same measure. Each goal was considered to determine the best methods for evaluating the system's performance related to that goal.

The existing conditions related to each performance measure were derived primarily from analysis in the Airport System Plan. Based on the existing conditions, analysis of the potential for change as included in the Airport System Plan, discussions with VTrans staff, and consideration of similar performance in other state aviation systems, five-year targets were established for each performance measure. The Aviation System Performance Targets are presented below.

Performance Category	Associated Aviation System Goals		Performance Measures	Existing Conditions	5-Year Target
ACCESSIBILITY	A.	Provide a system of airports that is accessible for people and goods from the ground and air	Percent of Vermont's population and land area within 60-minutes of an airport with commercial service (Vermont and neighboring airports)	93% population 75% land area	Maintain existing standards
			Percent of Vermont's population and land area within 30-minutes of a 5,000-foot runway	62% population 75% land area	Increase to 70-75% population 80% land area
			Percent of population and land area exclusively served (within 30 minutes) by a privately-owned public-use airport	8% population 11% land area	Decrease to 5% population 10% land area
	B.	Provide intermodal ground access opportunities/services (such as rental car, taxi, bus, bike)	Percent of airports with intermodal opportunities/services	70%	Increase to 80%
DEVELOPMENT	C.	Preserve and enhance existing infrastructure investment through maintenance, rehabilitation and development of new infrastructure	Percent of system airports meeting corporate aviation-related facility and service objectives including runway length and width, taxiway type, approach, and fuel	44%	Increase to 50%
			Percent of system airports having a pavement condition index (PCI) of "good" or better	75%	Increase to 85%
	D.	Promote airport-compatible land uses	Percent of airports having local airport-related zoning	53%	Increase to 100%
			Percent of airports that are recognized in regional land use plans that include airport-compatible land uses in the airport environs	76%	Increase to 100%
SAFETY AND SECURITY	E.	Provide safe and secure system of airports that meets State and federal guidelines, including 5010 inspection program	Percent of airports meeting applicable FAA airport design standards	TBD	75%
			Percent of airports meeting applicable VTrans or TSA security-related recommendations	TBD	100%
			Percent completion of monthly safety inspections at all State-owned airports	100%	100%

Performance Category	Associated Aviation System Goals		Performance Measures	Existing Conditions	5-Year Target
FUNDING AND ECONOMICS	F.	Seek adequate and stable funding, including FAA assistance, and assure appropriate staffing to support the Agency's mission	Achieve block grant status with FAA	Conventional FAA funding	Achieve block grant status by 2010
	G.	Maintain and utilize Vermont's Airport Capital Facilities Program to make appropriate and timely investment decisions or project prioritization decisions	Implementation of updated computerized Airport Management System	TBD	Complete by 2009
	H.	Maintain Commercial Air Service at Rutland State Airport and support its development elsewhere in the state AND Encourage additional commercial and cargo services where appropriate	Number of airports with commercial air service and cargo activity	2 airports	2 airports
MAINTENANCE	I.	Maintain an up-to-date database on aviation facilities	Implementation of updated web-enabled database system that provides additional features including performance measurement tracking	Underway	Complete by 2008
	J.	Strive to generate appropriate revenues from the operation of the State-owned airports utilizing a business-oriented approach with the leases	Number of airport leases that have been updated with current rate structures	TBD	Increase by 3% annually

Performance Measure and Target Actions

Specific five-year targets have been established for the performance measures that have been developed related to the aviation system goals. In order for these targets to be met, steps must be taken to gather data, update information, and measure the progress of VTrans. The following summarizes these implementation actions related to the goals, measures, and targets.

Goal A. Provide a system of airports that is accessible for people and goods from the ground and air

There are three performance measures associated with this goal. To track the progress of these three performance measures, an update of analyses from the Airport System Plan must be prepared. This update would require updated population data, examination of runway length changes, and consideration of the change in ownership conditions for Vermont's privately owned, public-use airports. The Airport System Plan used Geographic Information Systems (GIS) to evaluate the measures including the percent of Vermont's population and land area within 60-minutes drive of an airport with commercial service, percent of Vermont's population and land area within 30 minutes of a 5,000-foot long runway, and percent of population and land area exclusively served by a privately owned, public-use airport. These GIS files would need to be updated by VTrans to evaluate changes in the conditions relative to meeting the five-year targets.

It is recommended that these measurements be evaluated when any of these conditions change, especially the change in ownership or the completion of a runway extension that provides for at least 5,000 feet of length at one of Vermont's airports. These are the primary means for achieving change in the existing conditions for these performance measures. Using the files from the Airport System Plan, VTrans staff could evaluate the changing conditions in GIS to determine how the five-year targets are being achieved in terms of population and land area coverage.

Goal B. Provide intermodal ground access opportunities/services (such as rental car, taxi, bus, bike)

Goal B has only one measurement, the percent of airports with intermodal opportunities or services. The conditions related to this goal were evaluated as part of the Airport System Plan where data on these conditions were gathered. For continued monitoring of this goal, VTrans staff could request information on the availability of these opportunities and/or services as part of routine inspections that are conducted such as the 5010 Inspection Program. Only a portion of the airports are inspected annually as part of this program, but information is requested from all airports annually regarding their capital improvement plans. It is recommended that this goal be measured annually either through these inspections or through yearly surveys of the airports conducted during the capital improvement plan development process.

To achieve the five-year target, encouragement and promotion of the importance of providing intermodal ground access opportunities and/or services needs to be stressed. Through meetings conducted as part of 5010 Inspections, the existing Vermont Aviation Advisory Council, and others, promotion of the importance and the process for obtaining these services should be discussed with the airport operators.

Goal C. Preserve and enhance existing infrastructure investment through maintenance, rehabilitation and development of new infrastructure

Two performance measures were identified to evaluate the progress on Goal C. These two measures (percent of system airports meeting corporate aviation-related facility and service objectives including runway length and width, taxiway type, approach, and fuel; and percent of system airports having a pavement condition index (PCI) of "good" or better) were evaluated as part of the Airport System Plan. To monitor the changes in performance relative to these measures, continued collection of data is required.

Significant data were collected as part of the Airport System Plan regarding existing conditions at Vermont's airports. These data have been maintained in hard copy format, but VTrans existing data management system does not provide a mechanism to add much of this data. As part of a subsequent goal, it is recommended that VTrans update its current airport management system to something such as Airport IQ to provide a means to store, retrieve and analyze data, including data on the ability of airports to meet corporate aviation-related facility and service objectives. Once the new system was established, data collected as part of 5010 inspections, capital improvement plans, master planning processes, and other means could be input into the system for future maintenance. The new system could also be developed to track the airport system's performance related to the measurements established as part of this Policy Plan and the Airport System Plan.

In order to improve the performance of this target, VTrans needs to continue its participation in the planning process for airports when issues such as corporate aviation needs are being evaluated for each airport. This target will only be reached through the development of longer runways and full-length parallel taxiways, implementation of improved instrument approach procedures into the airports, and provision of additional fuel at airports. VTrans is in a position of encouraging development of these facilities at airports, including potential funding, but must rely on the local airport community to support the need for these facilities.

Measuring the PCI could also be conducted during 5010 inspections, but a more detailed measurement has previously been performed for the 10 State-owned airports through the conduct of an Airport Pavement Management System (APMS). The APMS results could also be integrated into Airport IQ for tracking purposes.

The APMS provides a mechanism for maintaining pavements in good condition as it highlights steps that can be taken with all of the airport pavements to extend their useful life. The APMS process considers various options available to treat certain pavement conditions and recommends a cost-effective, long-term solution.

It is recommended that these measurements be tracked annually, especially once the Airport IQ system has been completed. The APMS data is typically updated every three years, providing VTrans a long-term method for examining pavement conditions and the impact of projects to extend pavement life.

Goal D. Promote airport -compatible land uses

Goal D has two performance measures that have been identified: percent of airports having local airport-related zoning and percent of airports that are recognized in regional land use plans that include airport compatible land uses in the airport environs. Again, as part of the Airport System Plan, data were gathered from the airports and from the regional planning commissions regarding the availability of airport-related zoning and the inclusion of airports in regional land use plans. This data has been provided to VTrans in hard copy format, but has not been integrated into an airport management system to track future changes.

VTrans' aviation staff members serve as a resource to the regional planning commissions related to airport compatible land uses. Through participation in airport planning processes and other meetings with local agencies in many towns throughout Vermont, VTrans works with these agencies and others to identify airport-related land use concerns, as well as FAA recommendations to promote compatible land use. It is recommended that VTrans start to track these meetings to ensure that they consistently work with local agencies to promote airport-compatible land uses.

The evaluation of the two performance measures should be conducted on an ongoing basis as VTrans learns of changes in existing conditions. At a minimum, these performance measures should be evaluated annually to determine if conditions have changed and what potential exists to maintain areas of compatible use. It is recommended that Airport IQ include a section on compatible land use including the storage of related maps, data, and contact information related to regional planning commissions.

Goal E. Provide safe and secure system of airports that meets State and federal guidelines, including 5010 inspection program

The safety and security of Vermont's airports is of utmost concern. Three performance measures were developed to evaluate the ability of VTrans to meet this goal: percent of airports meeting applicable FAA airport design standards; percent of airports meeting applicable VTrans or Transportation Security Administration (TSA) security-related recommendations; and percent completion of monthly safety inspections at all State-owned airports. Only one of these performance measures has been evaluated to date (monthly safety inspections), as additional data and analysis are needed to evaluate the other two measures.

The FAA has established airport design guidelines for the development of airports to promote safety based on the aircraft that are anticipated to use the airport on a regular basis. These guidelines include recommendations on runway length and width, building design, and safety areas. During airport master plans, the airport design guidelines are evaluated based on the aircraft currently operating at or projected to operate at the airport. As part of this process, recommendations related to meeting the guidelines are made. Information from these plans and others need to be compiled to evaluate the existing conditions related to meeting FAA airport design guidelines.

To date, the TSA has focused on security requirements for commercial service airports, while only providing guidance for general aviation airports. Based on the TSA guidance provided, VTrans is evaluating its security needs specific to each airport and the activities in the airport environs, but has not established State-specific security recommendations. In order for this performance measure to be evaluated, VTrans needs to develop its security recommendations and then conduct evaluations of the airports to determine if they meet the recommendations.

These two performance measures should be evaluated once all existing data has been collected and the security recommendations established, with a goal of completing this in two years and continued evaluation indefinitely. The importance of these measures dictates that the performance should be very high and that airport design standards and security recommendations should be given careful consideration.

Goal F. Seek adequate and stable funding, including FAA assistance, and assure appropriate staffing to support the Agency's mission

Stabilized funding provides a means to ensure that airports are maintained and developed to meet standards, accommodate projected demand, and serve their roles in the national system of airports. The FAA's process for funding does not currently take into consideration the specific desires of VTrans to develop its airport system based on statewide needs. VTrans is interested in achieving "block grant status" with the FAA which would allow the agency the ability to determine the distribution of federal funds for improvement projects at general aviation and non-primary commercial service airports. The most important benefit of the Federal State Block Grant Program is the ability to assess project justification based on local, regional and statewide conditions and to adapt State, federal and local funds to meet the immediate and future needs of Vermont's airport system.

Participating in the Federal State Block Grant Program requires VTrans to implement certain responsibilities previously undertaken by the FAA New England Region. VTrans would be responsible for determining the level of environmental analysis required for airport improvement projects and for approving environmental assessments and impact statements at general aviation and non-primary commercial service airports. VTrans would also provide technical assistance and coordination throughout the environmental process. As an FAA Block Grant State, VTrans would be responsible for approving airport layout plans, accepting airport master plans and monitoring airport sponsors' compliance with the federal grant assurances the airports accepted prior to receiving FAA airport improvement funds.

To participate in the Federal State Block Grant Program, the FAA must expand its eligibility criteria and permit additional states to participate. Expansion is currently under consideration by the FAA as part of its 2007 reauthorization process. Expansion of the program and acceptance of VTrans' application to participate would be required for this performance measure to be achieved. Once this status is achieved, this performance measure would not need to be tracked in the future.
This performance measure impacts the second performance measure under Goal F, number of aviation staff, but is not the sole purpose for using this measurement. VTrans' aviation staff members have responsibility for numerous assignments, as discussed previously under the Aviation Mission. With responsibilities ranging from airport maintenance, to aircraft management and assistance to other agencies, to emergency services and disaster recovery assistance, to airport grant applications, monitoring, and closeout, to managing hundreds of leases on State-owned airports, increased staff efficiency and cross utilization is required for the aviation group to meet all needs in a timely, cost-effective manner. The aviation group is currently relying on staff not assigned to aviation to assist with efforts such as project

management and property/lease management. Additional staff would help the aviation group to better assist other state agencies with aircraft usage for projects such as natural resource management and disaster recovery.

Goal G. Maintain and utilize Vermont's Airport Capital Facilities Program to make appropriate and timely investment decisions or project prioritization decisions

Goal G has only one measurement: implementation of an updated computerized Airport Management System. As previously noted, consistent with the Strategic Enterprise Initiative, VTrans should update its existing database to provide additional mechanisms for tracking data for use in the Airport Capital Facilities Program (ACFP), analysis of performance measures, grant funding, and coordination of planning efforts. VTrans is implementing the Airport IQ system which includes an update of the Airport Project Prioritization System that assists in developing the ACFP. The Airport Project Prioritization System should be evaluated once data is gathered on previous measurements such as adherence to airport design guidelines and security recommendations. Data gathered regarding these measures may require changes to the Airport Project Prioritization System.

It is recommended that VTrans evaluate the Airport Project Prioritization System once the Airport IQ system is implemented and the results of the other performance measures are available.

Goal H. Maintain Commercial Air Service at Rutland State Airport and support its development elsewhere in the state and encourage additional commercial and cargo services where appropriate

Commercial airline service is critical to the statewide economy as it provides businesses and visitors a method of traveling to Vermont. This goal is important not only to VTrans but to all other agencies in the State. The performance measure for Goal H calls for at least maintaining the number of airports with commercial air service and cargo activity, even though additional service is encouraged. With the continued federal budget issues, the Essential Air Service (EAS) program that provides a subsidy to Rutland to maintain service is at risk for future funding. The EAS program is constantly evaluated by the federal government, with changes to the subsidy rates and evaluation criteria occurring regularly.

This performance measure will require continued monitoring of the EAS program and the commercial airline environment to determine if changes are imminent.

Goal I. Maintain an up-to-date database on aviation facilities

The maintenance of data is critical to any evaluation of performance measures. As previously noted, VTrans is implementing the Airport IQ system which will provide an updated database. Data in the system, however, will need to be updated annually in order for the system to provide meaningful results. This measurement will be completed once the Airport IQ is in place, which is anticipated in 2008.

Goal J. Strive to generate appropriate revenues from the operation of the State-owned airports utilizing a business-oriented approach with the leases

Vermont's State-owned airports each have numerous leaseholds that provide an opportunity for revenue generation. VTrans currently has one staff member (not employed in the aviation group) that is responsible for managing all of the existing aviation leases that number in the hundreds. This management process is not formalized as guidelines and policy on how the leases should be structured does not exist. The current leases are structured based on historical precedent and have not been evaluated to determine their relevance to other aviation leases in Vermont or in other nearby states. It is recommended that an analysis of the leases be conducted on a full-scale basis to determine their currency. This analysis could be conducted by a VTrans staff member who is dedicated to this function or outsourced to a consultant.

VTrans is planning to undertake airport business plans for each airport that will examine leases, as well as rates and charges and other means to take a more business-oriented approach to the airports.

The evaluation of this performance measure will be determined once the number of airport leases and their currency and relevancy are established. Once a baseline for all leases is developed, it is recommended that that this measure be analyzed annually to determine if the five-year target of increasing the current lease structures is accomplished.

Appendix A: Rates and Charges Overview

INTRODUCTION

The objective of this Rates and Charges Overview is to document the Vermont Agency of Transportation's (VTrans) current policies and practices regarding rates and charges at general aviation (GA) airports and to assess the appropriateness of existing practices given Federal Aviation Administration (FAA) guidelines and practices adopted by other GA airports, especially state-owned GA airports.

KEY FINDINGS

- Federal policy for GA airports supports fee and rentals structures to help ensure that airports are as financially self-sufficient as possible, without discriminating against any particular user or user group.

- The average rate of all leases in 2005 at state-owned GA airports in Vermont is $0.084 per square foot.

- Vermont's average lease rate is higher as compared with Wisconsin ($0.06) but lower than Minnesota ($0.12 - $0.14) or in the states participating in a comprehensive study of general aviation rates conducted by the Wyoming Department of Transportation ($0.11 - $0.13).

- VTrans currently does not charge fuel or tie-down fees, but typically collects a flat fee from fixed base operators (FBOs) plus three percent of revenues in lieu of such charges.

- Surveys of other GA airports suggest many GA airports also collect revenues from fuel flowage and/or storage fees as well as tie-down fees.

Federal Policy

The FAA published a policy statement about airport rates and charges entitled "Policy Regarding Airport Rates and Charges," published in the Federal Register, Volume 61, Number 121, dated Friday, June 21, 1996. This policy assumes local institutions and markets will ensure compliance with guidelines and legal requirements.

Federal policy for setting airport rates and charges is based on four guiding principles:

- Rates, fees, rentals, landing fees and other service charges imposed on users of airport facilities must be fair and reasonable;
- Fees must not unjustly discriminate against aeronautical users or user groups;
- Fee and rental structures should be structured so as to make the airport as financially self-sustaining as possible; and
- Revenues generated by the airport typically must be used for airport purposes.

Current Practices at GA Airports

To understand the current rates and charges practices at GA airports nationally, WSA prepared a literature search of published policies, statewide surveys and GA airport business plans. These sources were reviewed to ascertain the prevalence and average rates of individual airport fees and charges as well as to determine the application of such fees as part of individual airport business plans. The largest single source of rates and charges at GA airports was an Update to the Rates and Charges Guide published by the Wyoming Department of Transportation (DOT) in 2004. This study reports on 66 GA airports across the western part of the United States. A full list of sources reviewed is included at the conclusion of this overview.

GA airports have limited sources for operating revenues in that their revenue-producing services primarily cater to non-commercial aviation and serve relatively low volumes of aircraft. In addition, many GA airports are un-towered facilities, making the collection of landing fees challenging. As a result, some airports package fees or charge higher rates on a more narrow range of services as compared with commercial airports. Accordingly, most GA airports rely on land leases and rents, hangar rentals, and fuel flowage fees as their primary income sources. This is true for state-owned GA airports such as those in Vermont as well as municipally and/or privately owned airports throughout the country.

The following provides a review of the some of the most common rates and charges used at GA airports.

LAND LEASES/RENTS

Property revenues collected at GA airports typically include the lease of building space and land for aviation and industrial/commercial uses. Aviation land refers to land leased to non-FBO aviation operators, such as charter operators and freight carriers; aviation land typically has taxiway or ramp access. Industrial/Commercial land includes land adjacent to the airport operations that generally does not have ramp or taxiway access. Hangar space is also an important revenue source; some airports lease land to private owners who build their own hangars and other airports build and rent hangar space themselves. In addition, some GA airports also lease land not needed for aeronautical purposes, such as agricultural uses.

Leases are typically charged according to a square footage rate and are set to reflect fair market rent. According to the Wyoming DOT survey conducted in 2003, 61 percent of the GA airports surveyed earned income from leased property and land, the most common of which was charges for hangar space. Average lease rates by type of rental are listed in **Table A-1**.

Table A-1
Survey Averages Property Land Lease Rates at GA Airports

Source	Aviation Land	Industrial/ Commercial	Hangar	Agricultural (per acre)
Wyoming Study	$0.15	$0.12	$0.10	n/a
Minnesota	$0.14	$0.13	$0.12	$67.25
Wisconsin	$0.06	$0.06	$0.09	$42.10

Note: Charges represent averages, based on dollars per square foot per year, agricultural per acre.
Sources: Wyoming DOT Rates and Charges Guide, Update 2004; Wisconsin DOT 2004 Airport Rates and Charges Survey; Minnesota DOT 2004 Rates and Charges Survey

FUEL FLOWAGE/STORAGE FEES

A second important source of revenues for GA airports is fuel storage or flowage fees. Fuel storage fees are per gallon fuel charges levied on an entity dispensing aviation fuel used, sold or transferred on airport property. Typically, both flowage and storage fees are passed on to the fuel purchasers.

According to the Wyoming DOT survey from 2003, 23 percent of the GA airports charge fuel flowage or storage fees. The Wyoming survey also notes that, when compared with Commercial Service airports, GA airports often levy substantially higher per gallon fuel storage or fuel flow charges. Likely reasons for the higher fees include using fuel fees as a mechanism to capture landing fees as well as the fact that GA airports sell a much smaller volume of fuel. **Table A-2** shows average fuel storage/flowage fees charged at GA airports by survey source.

Table A-2
Average Fuel Storage/Flowage Fees at GA Airports

Source	Fuel Storage Flowage – per gallon
Wyoming Study	$0.16
Minnesota	$0.06
Oregon*	$0.12
Wisconsin	$0.11 (100LL) $0.06 (Jet A)

Note: Oregon's rate set as maximum allowable charge
Sources: Wyoming DOT Rates and Charges Guide, Update 2004; Wisconsin DOT 2004 Airport Rates and Charges Survey; Minnesota DOT 2004 Rates and Charges Survey; Oregon Rates and Charges Policy, 2002.

TIE-DOWN FEES

Another common charge levied at GA airports is tie-down fees. Such fees may be levied on transient and permanently based aircraft. Rates are typically set according to length of stay (daily, weekly and monthly) and may vary according to aircraft type. About 16 percent of GA airports participating in the 2003 Wyoming survey reported charging tie-down fees. **Table A-3** highlights average tie-down fees charged at GA airports by aircraft type and length of stay.

Table A-3
Average Tie-Down Fees at GA Airports by Aircraft Type and Length of Stay

Source	Single-engine	Multi-engine	Jet Aircraft	All Aircraft Types
Overnight Rates				
WYDOT Study	$3.63	$6.88	$18.40	
Minnesota				$5.50
Wisconsin	$1.60	$1.60	n/a	
Monthly Rates				
WYDOT Study	$22.75	$32.86	$22.50	
Minnesota				$41.67
Oregon	$15.00	$20.00	n/a	
Wisconsin	$10.40	$10.40	n/a	

Source: Wyoming DOT Rates and Charges Guide, Update 2004; Wisconsin DOT 2004 Airport Rates and Charges Survey; Minnesota DOT 2004 Rates and Charges Survey; Oregon Rates and Charges Policy, 2002

Mobile Service Provider Fees

Some GA airports levy mobile service provider fees on persons or entities that provide commercial aeronautical services but do not operate out of owned or leased property at the airport. Examples of mobile service providers include mobile mechanics, flight instructors, mobile oil recyclers, etc. Such fees are typically small. In Minnesota, for example, GA airports charge mobile service provider fees between $15 and $25 per month for permits.

FBO Fees

In lieu of collecting fees on a service-by-service basis, many GA airports charge fixed base operators (FBOs) licensing or operating fees. FBO fees may be set as a flat rate on an annual or monthly schedule, as part of a lease rental (i.e. square footage charge) and/or a percentage of revenues. FBO charges typically include business licenses that permit the sale of specific services to general aviation users such as permanent and transient tie-downs, hangar space, fuel sales, mobile service providers, etc. According to the 2003 Wyoming survey, approximately 23 percent of GA airports responding to the survey charged FBOs some type of operating fee; such fees may or may not be in addition to other fees listed above.

Review of Select Individual Airport Rates and Charges

In addition to considering surveys of GA airport rates and charges, WSA also examined selected municipally owned airports in New England plus a fourth municipal airport in Arkansas for which information was readily available. The purpose of this review was to understand rates and charges at individual airports and the importance of different charges to airport operations. Airports reviewed include:

- Boire Field in Nashua, New Hampshire
- Lebanon Municipal Airport in Lebanon, New Hampshire
- Wiscasset Municipal Airport in Wiscasset, Maine
- North Little Rock Municipal Airport in Little Rock, Arkansas

Table A-4 shows the rates and charges at Boire Field and Wiscasset Municipal airports. The information provides an example of the range of fees charged as well as the amounts collected. Both of these airports are financially self-sufficient. Boire Field adjusts lease rates annually according to a multiplier based on the consumer price index (CPI).

Table A-4
GA Airports, Fee Rates or Portion of Operation Budget

Airport Name	Fees Types (Rates or Portion of Operating Budget)
Boire Field Nashua, NH	Land leases – aviation related $0.18/sq. foot Land leases – non-aviation $0.36/sq. foot Fuel flowage fees – $0.08/Avgas; $0.09 Jet fuel Tie-down fees – vary $30 - $60/month Overnight - $5/single; $10/multi; $15/jet Portion of excise taxes paid to state for aircraft registration
Wiscasset Municipal Airport Wiscasset, ME	Hangar land leases - $0.05/square foot Hangar space - $150/month/aircraft Tie-down fees - $5/night; $25/month Fuel flowage fees - $0.05/gallon

Sources: Interview with Airport Managers, Boire Field, NH and Wiscasset, Maine

Table A-5 highlights the portion individual fees that contribute to the airport's operating budget. In the case of Lebanon which has limited commercial air services, landing fees represent the most significant portion of revenue (34 percent), followed closely by land leases and rents (22 percent). For North Little Rock Municipal Airport, leases and rentals comprise 87 percent of the airport's operating budget.

Table A-5
Rates and Charges as a Portion of GA Airport Operation Budget

Airport Name	Fees Types (Rates or Portion of Operating Budget)
Lebanon Municipal Airport West Lebanon, NH	Landing fees (34 percent) Land leases and rents (22 percent) Parking fees (20 percent) Fuel flowage fees (9 percent) FBO commissions (6 percent) Portion of excise taxes paid to state for aircraft registration
North Little Rock Municipal Airport Little Rock, AR	Leases and rentals (87 percent) Aircraft hangar storage (6 percent) Fuel (2 percent) Tie-down fees (1 percent)

Source: Airport Business Plan, Lebanon Municipal Airport, revised 2004; North Little Rock Municipal Airport, Airport Business Plan.

Current Practice in Vermont

There are currently FBOs at nine of the 10 State-owned GA airports in Vermont. In each case, FBOs function as private entities that operate aviation-related businesses at their respective airports. In addition, some FBOs provide basic airport maintenance services for VTrans by maintaining the airports on a daily basis to meet FAA operating standards and guidelines. Vermont pays these FBO approximately $12,000 - $15,000 per year for these basic airport maintenance services.

FBOs, on the other hand, pay the State for use of the State-owned airport facilities, including rents on airport land and property; FBOs pay a flat fee of $550 per month plus a percentage of their gross income, which can range from three to one and one-half percent, with most agreements held at three percent. FBO operators are permitted to charge fair and reasonable rates for the services they provide at the airport, such as tie-downs, aircraft maintenance, etc. Exceptions to these State fees are granted on a case by case basis, as the State recognizes challenges associated with earning revenues at some of Vermont's more remote airports.

Individuals and organizations also lease land and/or hangar space from the State. Vermont typically leases land rather than hangar space. Leases are offered for a 25-year period with four renewal increments every five years. The State retains the right to increase rents based on changes in the Consumer Price Index (CPI). Most leases also permit the State to increase rates annually. Generally-speaking, however, unless something changes and there is a reason to renegotiate the lease, the State will only reconsider terms every five years.

Table A-6 highlights each of the state-owned airports in Vermont together with the lease rates charged at each airport. The average rate for land and ground leases at state-owned GA airports in Vermont is approximately $0.089 per square foot.

Table A-6
Lease Rates at Vermont's State-owned GA Airports

Airport	FBO	Number and Type Of Leases	Rate per Square Foot
Caledonia County	No	11 ground leases and 6 personal tenants	$0.075
E.F. Knapp	Yes	21 leases; 14 ground leases; 1 restaurant lease 1 FBO lease; 1 office space lease 6 ground leases pending	$0.10
Franklin County*	Yes	42 leases, 1 FBO lease and 1 Commercial lease; 4 leases and several amendments pending	$0.085
Hartness	Yes	4 land leases, 1 FBO lease and 3 ground leases	$0.085
J. H. Boylan	Yes	1 ground lease and 1 house/apt. lease 1 lease pending	$0.045
Middlebury	Yes	11 leases, 1 FBO lease and 1 commercial lease 2 leases pending	$0.085
Morrisville/Stowe	Yes	13 leases and 1 FBO lease 2 leases pending	$0.10
Newport	Yes	12 leases and 1 FBO lease	$0.085
Rutland	Yes	27 leases, 1 FBO and 5 commercial leases	$0.10
W.H. Morse	Yes	22 leases and 1 FBO lease	$0.08

Source: VTrans, November 2005
Notes: Shown rates indicate current charges; several rates are under negotiation.

Summary of Results

The results of this brief review and analysis of Vermont's airport rates and charges at State-owned airports in comparison to those charged by other GA airports throughout the U.S. has shown Vermont's current policies are much different than those used by others in various parts of the country. As the owner of 10 airports, some of which are located in remote areas, Vermont has chosen to implement a system whereby the rates and charges, and even payments, provide on-site services to the airports and the users at a price that does not return a profit to VTrans. While GA airports throughout the country are more likely to rely on some form of subsidy to meet operational needs, since Vermont's airports are State-owned, the subsidy comes from the State when the rates and charges do not provide sufficient revenue to meet the operational needs.

It appears there is a need to review the process used by VTrans to set the rates and charges. The current process has been conducted on an ad hoc basis without an established policy by a staff member who is not part of the aviation team. This staff member has worked diligently to establish reasonable rates and charges at the airports given the conditions in each community and the demand for aviation services.

Without a dedicated full-time aviation resource to monitor and evaluate the rates and charges, a policy should be developed to ensure the ability of VTrans to effectively manage the leases, rates, and charges at the State-owned airports for the long term. Establishment of a policy is recommended for VTrans to formally implement an up-to-date, reasonable rates and charges plan. While an across-the-board policy is not likely to be effective given the varying conditions in each community and the level of aviation demand, this policy could address the specific issues and provide a mechanism for review and update in the future as conditions warrant.

There are other issues that could be considered as part of a detailed analysis of Vermont's rates and charges at State-owned airports. These include state ownership of hangars, revision of privately-built hangars to the State at the end of the ground lease, fuel flowage and other fees, annual increases based on the Consumer Price Index (CPI), and requirements for service provision. All of these issues should be examined on an individual basis for their appropriateness for each airport.

These issues and others are typically addressed through detailed business planning for individual airports. Business planning looks at each airport's opportunities based on its location, role in the system, and community assets, and evaluates the potential revenues and expenses based on these conditions. Development of business plans would address these rates and charges, as well as one of the goals of the Policy Plan which identified striving to generate appropriate revenues utilizing a business-oriented approach. VTrans is undertaking business plans for the State-owned airports which should be completed by 2009.

SOURCES:

Minnesota Rates and Charges Survey, 2004
Published by Minnesota Airport Development Section; Survey of 23 airports in State of Minnesota.

Oregon State-Owned Airports Rates and Charges Policy, 2002
Oregon Department of Aviation

Wyoming Airport Rates and Charges Guide, Updated 2004
Published by Wyoming Department of Transportation, Aeronautics Division, Report includes self-reporting survey of 90 NPIAS Airports (66 designated as GA) from Wyoming, Arizona, Colorado, Idaho, Montana, Nebraska, South Dakota and Utah.

Airport Business Plan, Lebanon Municipal Airport, West Lebanon New Hampshire, 2004

North Little Rock Municipal Airport, Airport Business Plan

Telephone Interviews with Boire Field Airport Manager and Wiscassett Municipal Airport Manager

Appendix B: Photoslope Analysis

Recent changes to FAA Order 8260.3 (United States Standards for Terminal Instrument Procedures-TERPs) have included wording that if there are close-in obstructions or if there is a lack of approach information to determine the status of the Final Approach Course Visual Surface, night instrument flight rules (IFR) approaches will not be allowed for a particular runway or, in the extreme case, for the airport itself. Because of the Illinois Department of Transportation's experience with the PHOTOSLOPE process, they petitioned the FAA to have the results of PHOTOSLOPE used as sufficient documentation to confirm the status of their TERPS surfaces, as defined by Paragraph 251 of FAA Order 8260.3. On September 4, 2003, the FAA's Flight Technologies and Procedures Division approved the use of PHOTOSLOPE to document the visual surface assessment process of TERPs Paragraph 251.

TERPs Survey Process

In order to complete the PHOTOSLOPE analysis for TERPs Paragraph 251 requirements, a rigorous process has been established by GCR to ensure a high quality product with very accurate results. All work is accomplished in accordance with the requirements of specific runways, as defined in Terminal Instrument Procedures (TERPs) surfaces as described by Federal Aviation Administration (FAA) Order 8260.3B, Paragraph 251, Change 19.

GCR photogrammetrically documents the status of the specified runway based on TERPs surfaces as defined in FAA Order 8260.3B, Paragraph 251, Change 19, for the specified airports in the State of Vermont. GCR identified and located obstructions to each TERPS surface. In order to fulfill these requirements, GCR conducted the following:

- Surveyed and located monuments to be used for terrestrial photography
- Photographed the TERPs surface using PHOTOSLOPE terrestrial photography
- Identified the controlling obstruction and any other obstructions in accordance with FAA Order 8260.3B, Paragraph 251, Change 19

GCR assessed both straight-in approaches and offset approaches. In order to calculate offset approach requirements, the following data elements were used to develop the boundaries of the Visual Segment for Offset Course:

1) Sources of data used in computing the Offset Area

- Runway end geographic coordinates were obtained from FAA 5010 database and from VTrans Airport Directory
- The geographic coordinates of VORs were obtained from the FAA VOR database.
- The magnetic variation was also obtained from the FAA database.
- The published Instrument Approach Procedure Plate were used to obtain the following:
  - the Visual Descent Point (VDP) Distance
  - the final offset course magnetic azimuth to the VOR
  - computations for the geometric layout of the Visual Area were established using the software program COMPSYS21 (Digital Aeronautical Database System, DADS version 2.8/01) available on line from FAA
  - computations (all azimuths are magnetic in decimals of a degree; with distances in nautical miles (nm) or feet as (ft) as indicated and Geographic Coordinates are NAD 83

2) Offset Data Table

One of the deliverables is an Offset Data Table, which contains the Latitude and Longitude of each of the significant points of reference and alignments used to establish the Offset Final Approach Segment. The points of reference include:

- Runway end of pavement
- VOR
- Visual Decent Point (VDP)
- Point on Extended Centerline
- Flare Angle for Straight-in Approach
- Flare Angle for Offset
- Magnetic Variance

3) Aerial Photograph with Overlays

An aerial photo was provided with a depiction of the Offset Final Approach Segment. This overlay also included the location of critical obstructions to the surface.

4) Sketch showing the configuration of the Runway End Offset Surface

A sketch showing the construction of the Offset Surface was provided for each analysis.

All objects identified in the PHOTOSLOPE™ documentation will have been established using the Giant Software Program written for use by the U.S. Army Corps of Engineers in locating objects from aerial and terrestrial photography. The "object control" component of the Giant Software output confirms the accuracy of the controlling object to be less than 2 Ft. Horizontal and less than 1 Ft. vertical. Horizontal control is based on NAD 83 and vertical control is based on NAVD 88.

Deliverables

For each airport, GCR provided a PHOTOSLOPE booklet, which includes the dimensions and slope used to define each of the calculated surfaces and the procedures used to confirm the presence or absence of obstructions penetrating above these surfaces. The booklet includes all photographs, data tables, sketches and illustrations of each evaluation.

GCR also prepared one copy of a final report documenting all work described above, including all photographs and obstruction tables for each airport. GCR prepared a summary report of all surveys conducted at all airports for VTrans. Additionally, GCR developed one electronic copy of the final documentation and provided it in a format that is loadable on a public website for use by VTrans.

Appendix C:
Acoustical Counting Review

The Vermont Agency of Transportation (VTrans) was interested in obtaining information related to acoustical counting options for use in determining activity levels at its system airports. VTrans currently uses acoustical counters to gauge activity levels and wanted to compare their data to that available from other data sources.

GCR is one of the providers of a web-based, real-time, flight activity tracking and reporting system using the FAA's Aircraft Situation Display to Industry (ASDI), which originates from the Volpe Transportation Center. GCR provides this information to users through a system called the **Airport IQ Data Center**, which features live flight tracking for arriving and departing aircraft, FAA 5010 data, current airline and airport news, and critical operational activity reports. The data has been stored for the last 2 ½ years on GCR's servers, making it one of the most comprehensive databases of U.S. aircraft activity in the United States.

Drawing from the activity history database, the Data Center provides a series of activity reports which the user can query and print. These reports are described below.

Commercial Activity Landing Report

The Commercial Activity Landing Report provides a summary of all commercial activity (airline or non-airline) at an airport. This report provides data by operator and by aircraft type, which is valuable for comparing an operator's self-reported landings to actual landings recorded by the Federal Aviation Administration (FAA) air traffic control (ATC).

Market Share Report

This report provides a summary of the top city-pair markets for the selected airport, including a summary of flights by airline or non-airline for each city-pair. This report is great for route planning and air service development purposes.

Detailed General Aviation Activity

This report combines general aviation activity with the aircraft ownership database to provide an active view of which general aviation aircraft are operating at the airport. It includes aircraft ownership and which market-pairs are being served by each aircraft. This report is a valuable tool for understanding the nature and character of the general aviation activity at an airport.

Capacity Report

This option provides instant graphs and charts of daily operations at an airport by selected date ranges. It also provides hourly activity numbers for both arrivals and departures. This report is ideal for airfield and capacity planning purposes.

The data contained in GCR's AirportIQ Data Center will be used to test the usefulness of this data to augment the existing Vermont Acoustical Aircraft Counting Program. The data will also be evaluated to determine its usefulness in providing critical information to augment and update The Economic Impact of Vermont's Public-Use Airport Study.

Appendix D:
Facility and Service Objectives

Appendix A includes a detailed analysis of each airport's compliance with the facility and service objectives that were summarized by role depicted as **Exhibit 6-10** in Chapter Six, *Current System Performance*. The following sections discuss the facility and service objectives recommended for each of the four service roles and analyze each airport's compliance.

BENCHMARK: PERCENT OF SYSTEM AIRPORTS MEETING MINIMUM FACILITY AND SERVICE OBJECTIVES- RECOMMENDED ARC

Each airport in the FAA's National Plan of Integrated Airport Systems (NPIAS) is encouraged by the FAA to meet all applicable design and development standards. As mentioned in Chapter Five, the most demanding aircraft that operates at the airport on a regular basis with at least 500 takeoffs and landings a year determines each airport's individual design standards and is known as the design or critical aircraft. As stablished in Chapter Five, the following ARC objectives were established for the four airport roles:

- National Service Airports – C-II
- Regional Service Airports – B-II
- Local Service Airports – B-I
- Specialty Service Airports – D-I

Table D-1 provides information by airport role, on whether or not each airport currently meets its minimum facility standard for the ARC objective. Facilities needed to address current and future shortfalls will be identified in the next chapter of this document.

Table D-1
Performance Measure: Development
Airports Meeting Recommended ARC Objective

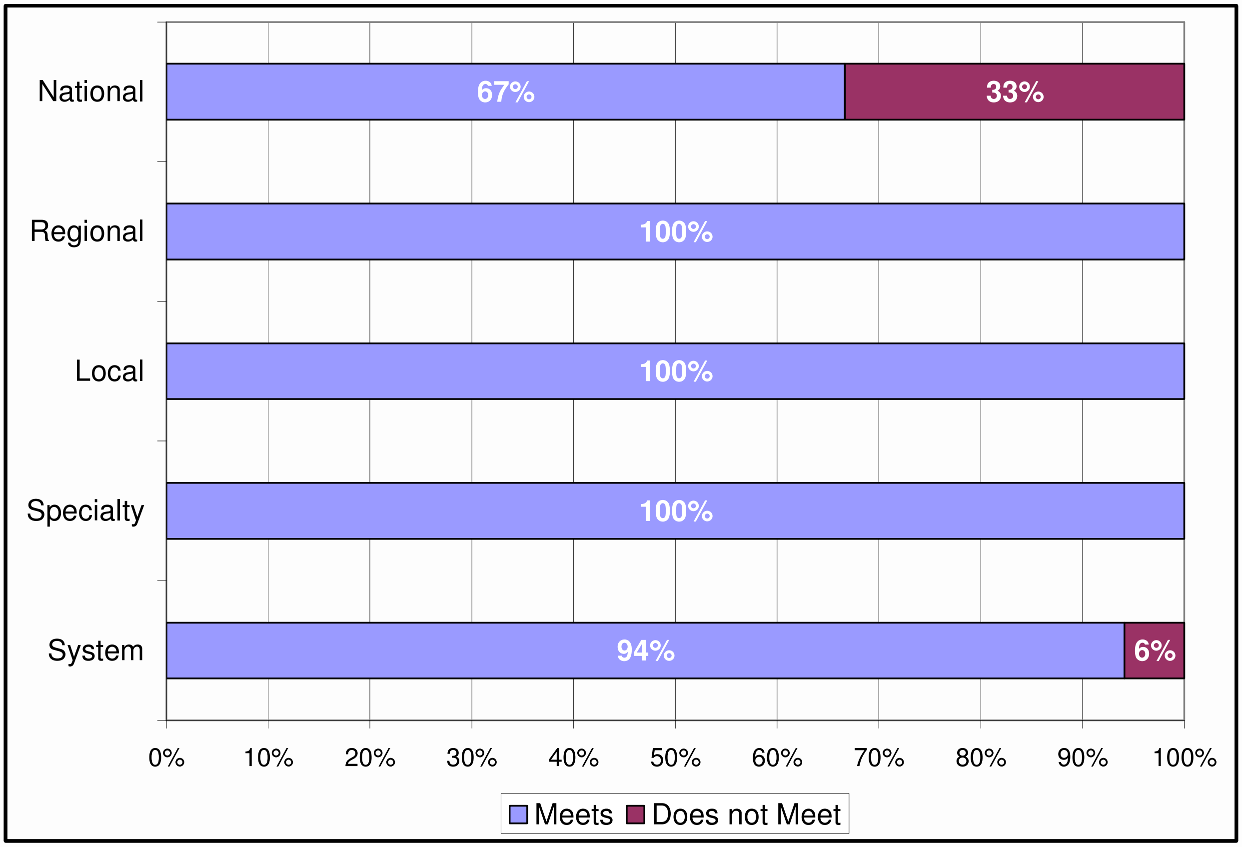
Airport Name	Associated City	Current ARC	Recommended ARC	Does Not Meet
National Service				
Burlington International	Burlington	D-V	C-II	
Edward F. Knapp State	Barre/Montpelier	B-II		X
Rutland State	Rutland	C-II		
Regional Service				
Hartness State	Springfield	B-II	B-II	
Morrisville-Stowe State	Morrisville	B-II		
William H. Morse State	Bennington	B-II		
Local Service				
Caledonia County State	Lyndonville	B-II	B-I	
Franklin County State	Highgate	B-II		
Middlebury State	Middlebury	B-I		
Newport State	Newport	B-II		
Specialty Service				
Basin Harbor	Vergennes	D-I*	D-I	
Fair Haven Municipal	Fair Haven	D-I		
John H. Boylan State	Island Pond	D-I		
Mount Snow	West Dover	D-I*		
Post Mills	Post Mills	D-I*		
Shelburne	Shelburne	D-I*		
Warren-Sugarbush	Warren	D-I*		

Source: Wilbur Smith Associates
*No ALP completed that states current ARC but airport is known to meet the D-I criteria

Exhibit D-1 shows that for the facility standards – ARC objectives benchmark, 67 percent of National, and 100 percent of Regional, Local, and Specialty Service airports currently meet their ARC objective. It is important to note that airports that are not included in the NPIAS are not required to meet FAA standards, however, the

FAA standards have been developed to promote the safe and orderly development of all airports and provide a reference point regarding facility development at all airports.

Exhibit D-1
Performance Measure: Development
Airports Meeting Recommended ARC Objective



Source: Wilbur Smith Associates

<u>BENCHMARK: PERCENT OF SYSTEM AIRPORTS MEETING MINIMUM FACILITY AND SERVICE OBJECTIVES-AIRPORTS MEETING RUNWAY LENGTH OBJECTIVES</u>

Adequate runway facilities, especially runway lengths, are important components of an aviation system. Facility and service objectives were developed for each of the four classification levels based on the types of aircraft anticipated to operate at airports in these classifications in Chapter Five. The established minimum runway length objectives by airport role are as follows:

- National Service Airports – 5,500 feet
- Regional Service Airports – 5,000 feet
- Local Service Airports – 4,000 feet

- Specialty Service Airports – Maintain existing length

In this analysis, the ability of the existing system to meet the identified minimum objective for primary runway length was examined using each airport's respective classification or role. An analysis of each airport's ability to meet the primary runway length for is presented in **Table D-2**.

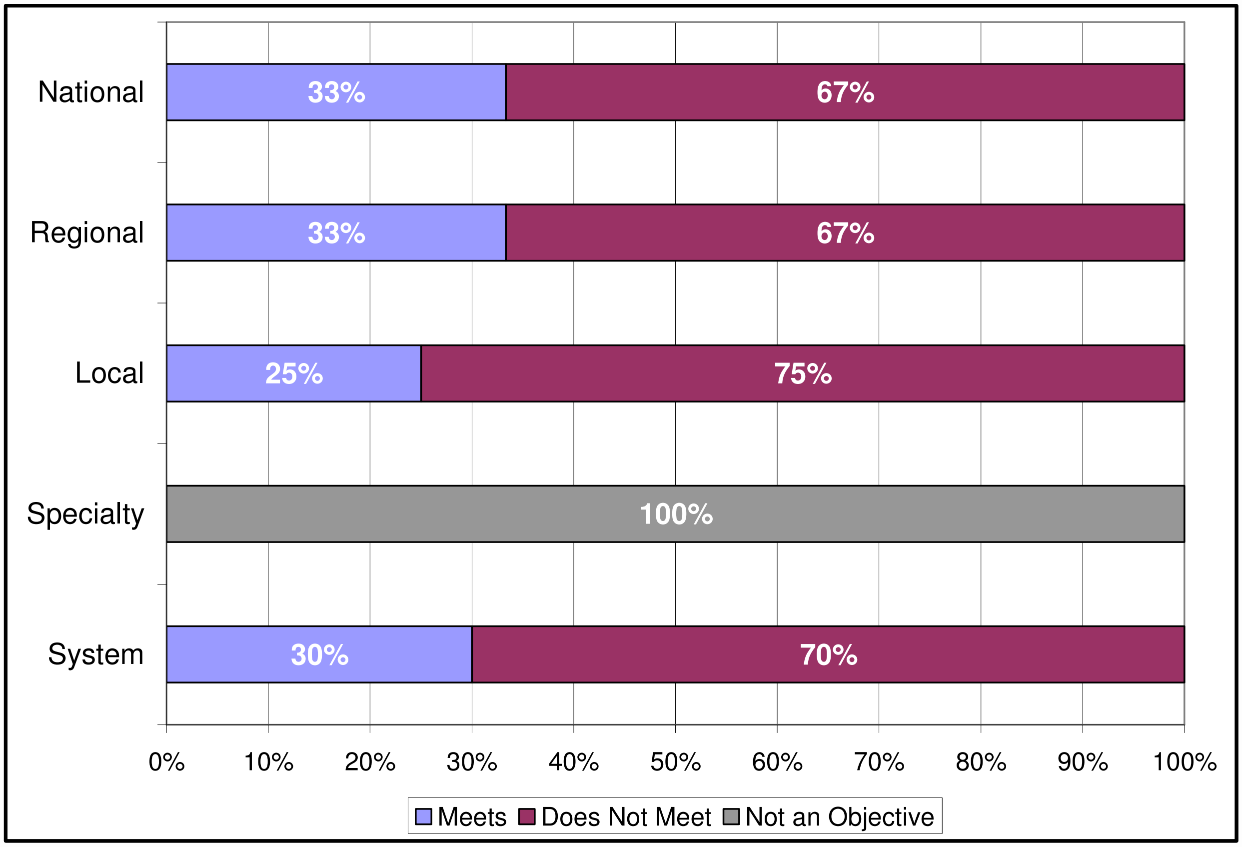
Table D-2
Performance Measure: Development
Airports Meeting Runway Length Objective

Airport Name	Associated City	Current Length	Recommended Length	Does Not Meet
National Service				
Burlington International	Burlington	8,320'	5,500'	
Edward F. Knapp State	Barre/Montpelier	5,002'		X
Rutland State	Rutland	5,000'		X
Regional Service				
Hartness State	Springfield	5,498'	5,000'	
Morrisville-Stowe State	Morrisville	3,701'		X
William H. Morse State	Bennington	3,704'		X
Local Service				
Caledonia County State	Lyndonville	3,300'	4,000'	X
Franklin County State	Highgate	3,000'		X
Middlebury State	Middlebury	2,500'		X
Newport State	Newport	4,000'		
Specialty Service				
Basin Harbor	Vergennes	3,000'	Maintain Existing Length	
Fair Haven Municipal	Fair Haven	1,950'		
John H. Boylan State	Island Pond	2,650'		
Mount Snow	West Dover	2,650'		
Post Mills	Post Mills	2,900'		
Shelburne	Shelburne	2,500'		
Warren-Sugarbush	Warren	2,575'		

Source: Wilbur Smith Associates

As shown in **Exhibit D-2**, only 30 percent of the system airports meet the minimum primary runway length objectives for their respective roles. Thirty-three percent of National, 33 percent of Regional, and 25 percent of Local Service airports currently meet their runway length objectives. While Specialty Service airports are only required to maintain their existing runway length, it should be noted that lengths range from 1,950 feet to 3,000 feet.

Exhibit D-2
Performance Measure: Development
Airports Meeting Runway Length Objective



Source: Wilbur Smith Associates

The Vermont Airport System Plan set recommended primary runway lengths as a basis for evaluation. It is important to note that runway length requirements are determined based on factors such as mean maximum daily temperature during the hottest month and the elevation of the airport. The System Plan's recommended primary runway lengths have not addressed the variations in these factors for each individual airport and as such serve as guidelines that require more detailed analysis as part of specific airport planning efforts. Airports that exceed the minimum primary runway length are recommended to maintain the additional length, as determined to be necessary.

Benchmark: Percent of system airports meeting minimum facility and service objectives-airports meeting runway width objectives

Another important component to the runway system is the width of the primary runway. It is important for runways to have adequate width that meet the minimum facility standards established as part of this study and meet FAA design standards. As established in Chapter Five, the following runway width objectives were established for the four airport roles:

- National Service Airports – 100 feet
- Regional Service Airports – 75 feet
- Local Service Airports – 75 feet
- Specialty Service Airports – 60 feet for NPIAS airports, maintain existing width for non-NPIAS

Table D-3 shows the current primary runway width for each airport compared to the width recommended by the system plan. Table D-3 also indicates which airports do not meet this facility objective.

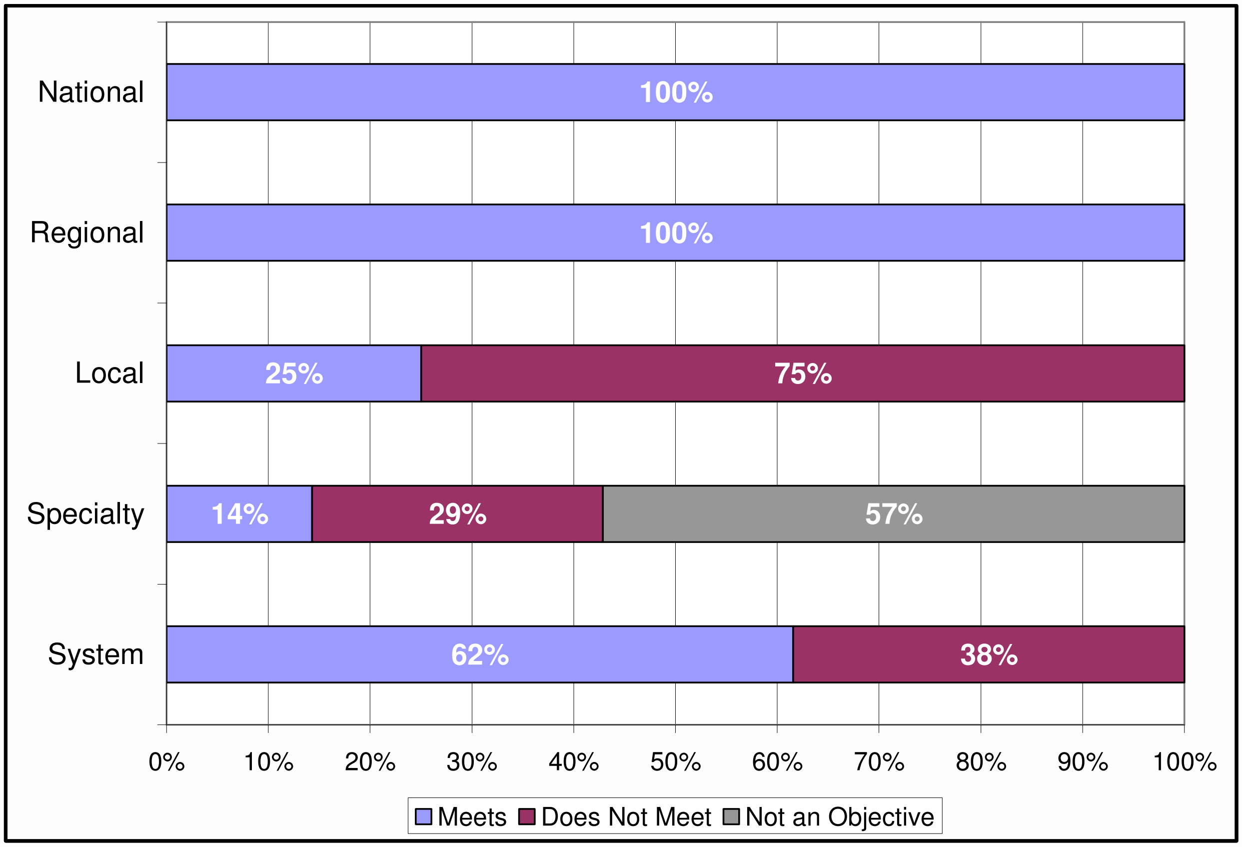
Table D-3
Performance Measure: Development
Airports Meeting Runway Width Objective

Airport Name	Associated City	Current Width	Recommended Width	Does Not Meet
National Service				
Burlington International	Burlington	150'	100'	
Edward F. Knapp State	Barre/Montpelier	100'		
Rutland State	Rutland	100'		
Regional Service				
Hartness State	Springfield	100'	75'	
Morrisville-Stowe State	Morrisville	75'		
William H. Morse State	Bennington	75'		
Local Service				
Caledonia County State	Lyndonville	60'	75'	X
Franklin County State	Highgate	60'		X
Middlebury State	Middlebury	50'		X
Newport State	Newport	100'		
Specialty Service				
Basin Harbor	Vergennes	90'	60' for NPIAS, Maintain Existing for Non-NPIAS	
Fair Haven Municipal	Fair Haven	20'		X
John H. Boylan State	Island Pond	120'		
Mount Snow	West Dover	75'		
Post Mills	Post Mills	80'		
Shelburne	Shelburne	60'		
Warren-Sugarbush	Warren	30'		X

Source: Wilbur Smith Associates

As shown in **Exhibit D-3**, 62 percent of the system airports meet the primary runway width objectives for their respective roles. One-hundred percent of National, 100 percent of Regional, and 25 percent of Local Service airports currently meet their runway length objectives. Only one of the three NPIAS airports in the Specialty Service category meets their objective.

Exhibit D-3
Performance Measure: Development
Airports Meeting Runway Width Objective



Source: Wilbur Smith Associates

BENCHMARK: PERCENT OF SYSTEM AIRPORTS MEETING MINIMUM FACILITY AND SERVICE OBJECTIVES-AIRPORTS MEETING RUNWAY STRENGTH OBJECTIVES

The length and width of a runway is not the only factor that determines or limits which types of aircraft can safely operate at an airport. The strength of a runway must be able to support the weight of aircraft which regularly operate at an airport. The following strengths were recommended for the primary runways at airports in each of the functional roles:

- National Service Airports – 60,000 pounds
- Regional Service Airports – 30,000 pounds
- Local Service Airports – 12,500 pounds
- Specialty Service Airports –Maintain existing strength

Table D-4 shows which airports meet their recommended primary runway strength.

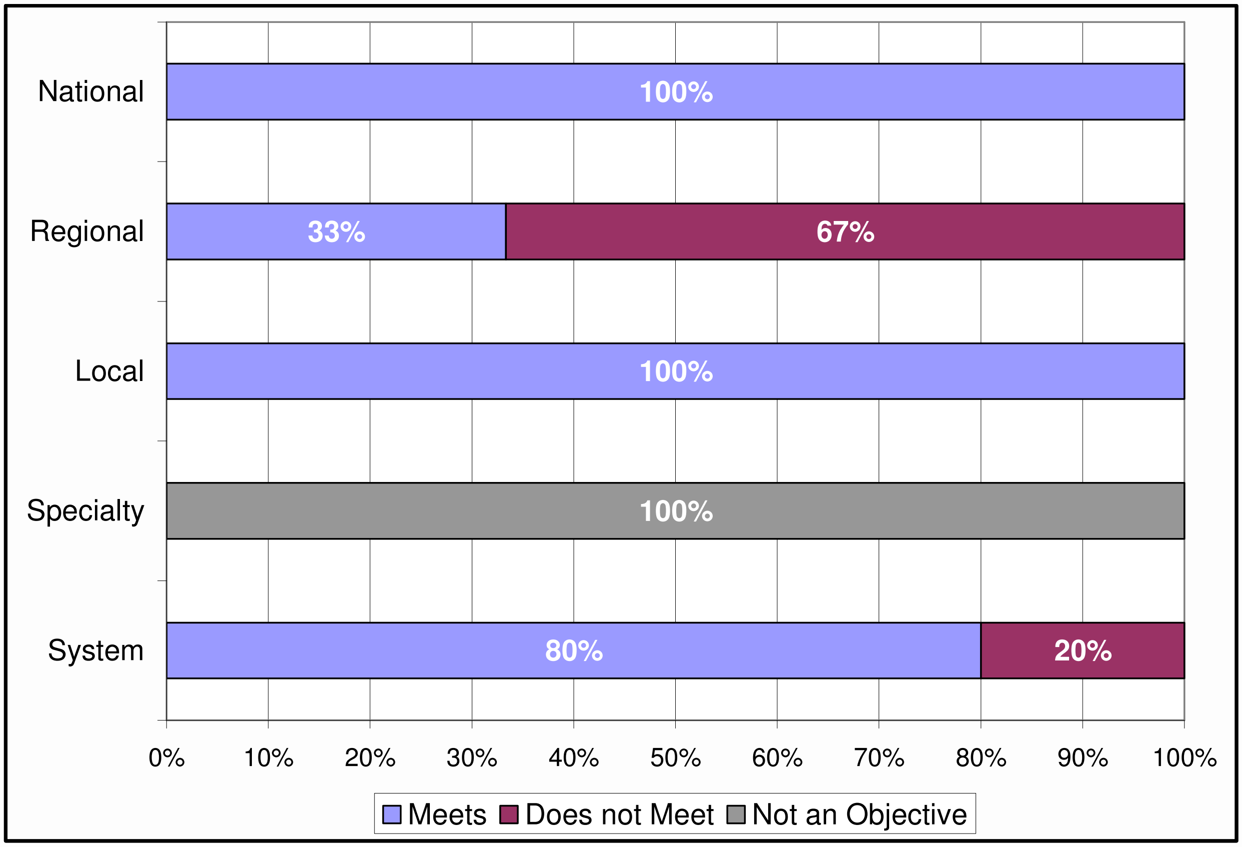
Table D-4
Performance Measure: Development
Airports Meeting Runway Strength Objective

Airport Name	Associated City	Current Strength	Recommended Strength	Does Not Meet
National Service				
Burlington International	Burlington	335,000 lbs.	60,000 lbs.	
Edward F. Knapp State	Barre/Montpelier	70,000 lbs.		
Rutland State	Rutland	68,000 lbs.		
Regional Service				
Hartness State	Springfield	45,000 lbs.	30,000 lbs.	
Morrisville-Stowe State	Morrisville	25,000 lbs.		X
William H. Morse State	Bennington	12,500 lbs.		X
Local Service				
Caledonia County State	Lyndonville	12,500 lbs.	12,500 lbs.	
Franklin County State	Highgate	12,500 lbs.		
Middlebury State	Middlebury	12,500 lbs.		
Newport State	Newport	44,000 lbs.		
Specialty Service				
Basin Harbor	Vergennes	Turf	Maintain Existing	
Fair Haven Municipal	Fair Haven	---		
John H. Boylan State	Island Pond	Turf		
Mount Snow	West Dover	---		
Post Mills	Post Mills	Turf		
Shelburne	Shelburne	Turf		
Warren-Sugarbush	Warren	8,500 lbs.		

Source: Wilbur Smith Associates

As shown in **Exhibit D-4**, all of the airports in the National and Local Service roles meet the recommended primary runway strength objective. Only one of the three airports in the Regional Service role meets the recommended strength of 30,000 pounds, which results in 80 percent of the airports in the overall system meeting their recommended runway strength.

Exhibit D-4
Performance Measure: Development
Airports Meeting Runway Strength Objective



Source: Wilbur Smith Associates

BENCHMARK: PERCENT OF SYSTEM AIRPORTS MEETING MINIMUM FACILITY AND SERVICE OBJECTIVES-AIRPORTS MEETING TAXIWAY OBJECTIVES

Taxiways are constructed to facilitate aircraft movements to and from the runway system. Strategically placed taxiway exits permit aircraft to clear the runway after landing and significantly increase the runway capacity. Some taxiways are necessary simply to provide access between the apron and runway, whereas other taxiways become necessary as activity increases and safer and more efficient use of the airfield is necessary. As established in Chapter Five, the following taxiway type objectives were established for the four airport roles:

- National Service Airports – Full Parallel Taxiway
- Regional Service Airports – Full Parallel Taxiway
- Local Service Airports – Connectors or Turnarounds, Partial Parallel Desired
- Specialty Service Airports – Connectors or Turnarounds, Partial Parallel Desired for Paved Runways

Airports meeting their respective minimum facility objective for taxiway type are shown in **Table D-5**.

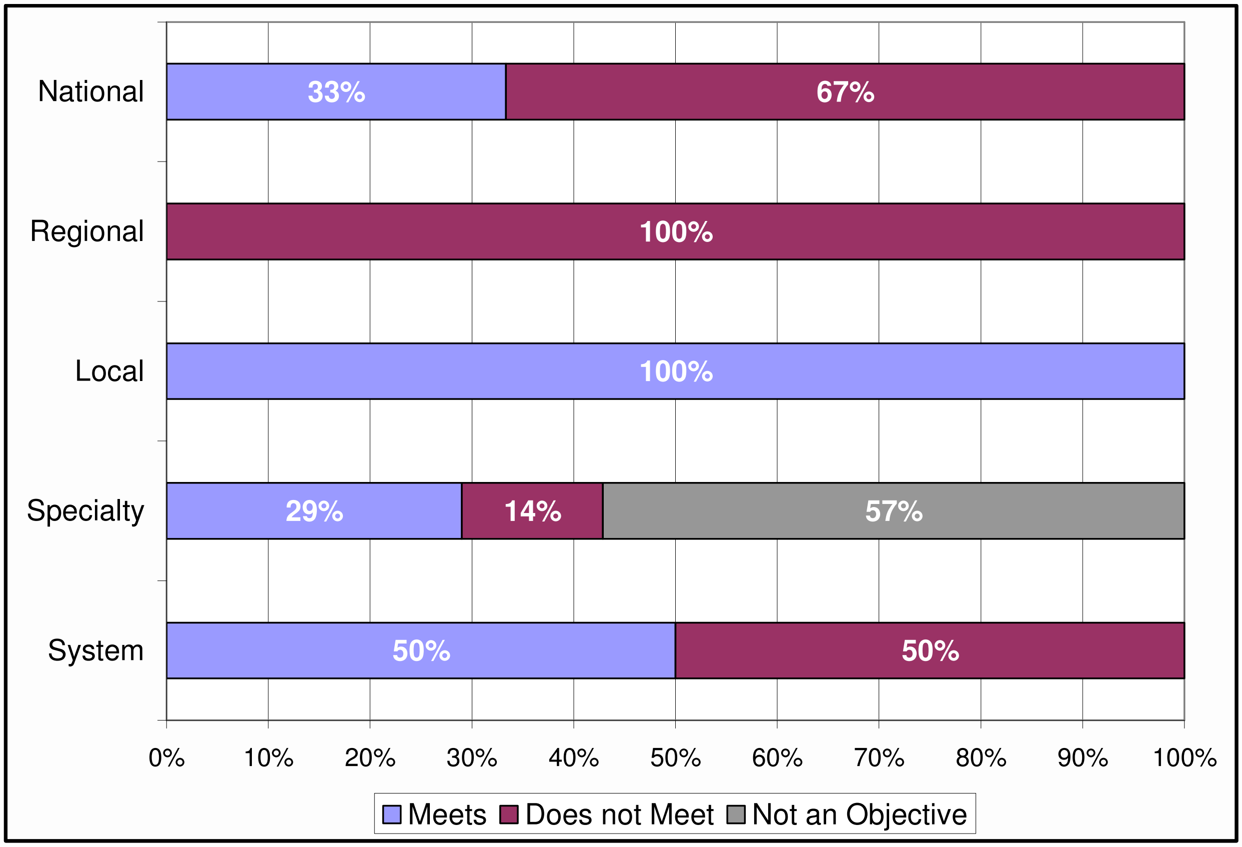
Table D-5
Performance Measure: Development
Airports Meeting Taxiway Objectives

Airport Name	Associated City	Meets	Does Not Meet	N/A*
National Service				
Burlington International	Burlington	X		
Edward F. Knapp State	Barre/Montpelier		X	
Rutland State	Rutland		X	
Regional Service				
Hartness State	Springfield		X	
Morrisville-Stowe State	Morrisville		X	
William H. Morse State	Bennington		X	
Local Service				
Caledonia County State	Lyndonville	X		
Franklin County State	Highgate	X		
Middlebury State	Middlebury	X		
Newport State	Newport	X		
Specialty Service				
Basin Harbor	Vergennes			X
Fair Haven Municipal	Fair Haven	X		
John H. Boylan State	Island Pond			X
Mount Snow	West Dover		X	
Post Mills	Post Mills			X
Shelburne	Shelburne			X
Warren-Sugarbush	Warren	X		

Source: Wilbur Smith Associates
*Not Applicable - no specific objective for airports with non-paved runways

Exhibit D-5 shows that currently, 33 percent of National Service and 100 percent of Local Service airports currently meet their taxiway objectives. None of the airports in the Regional Service role meet their recommended taxiway objectives. Two of the three airports with a paved runway in the Specialty Service role meet the taxiway objective. While it is desirable for all Local Service airports and Specialty Service airports with a paved runway to have a partial parallel taxiway, the only airport currently meeting this is Middlebury State. Overall, only 50 percent of Vermont's system airports meet their taxiway objectives.

Exhibit D-5
Performance Measure: Development
Airports Meeting Taxiway Objectives



Source: Wilbur Smith Associates

BENCHMARK: PERCENT OF SYSTEM AIRPORTS MEETING MINIMUM FACILITY AND SERVICE OBJECTIVES-AIRPORTS MEETING APPROACH OBJECTIVES

As mentioned in Chapter Five, airports were evaluated based on the type of the most demanding approach available or currently published. The following depicts the objectives that were developed for each of the categories:

- National Service Airports – Precision Approach (Ceiling Minimum of 200 feet or less and Visibility Minimum of ½ mile or less)
- Regional Service Airports – Non-Precision Approach (Ceiling Minimum of 400 feet or less and Visibility Minimum of 1 mile or less)
- Local Service Airports – Non-Precision Approach (Ceiling Minimum of 1,000 feet or less and Visibility Minimum of 3 miles or less)
- Specialty Service Airports – Visual Approach

Air accessibility was measured by identifying all system airports that have a published approach. **Table D-6** lists the Vermont airports that currently report having an instrument approach to at least one end of their primary runway. Table D-6 also shows each airport's minimum approach, which denotes the ceiling minimum in feet, followed by the visibility minimums, expressed in miles. Specialty Service airports are only recommended to provide a visual approach.

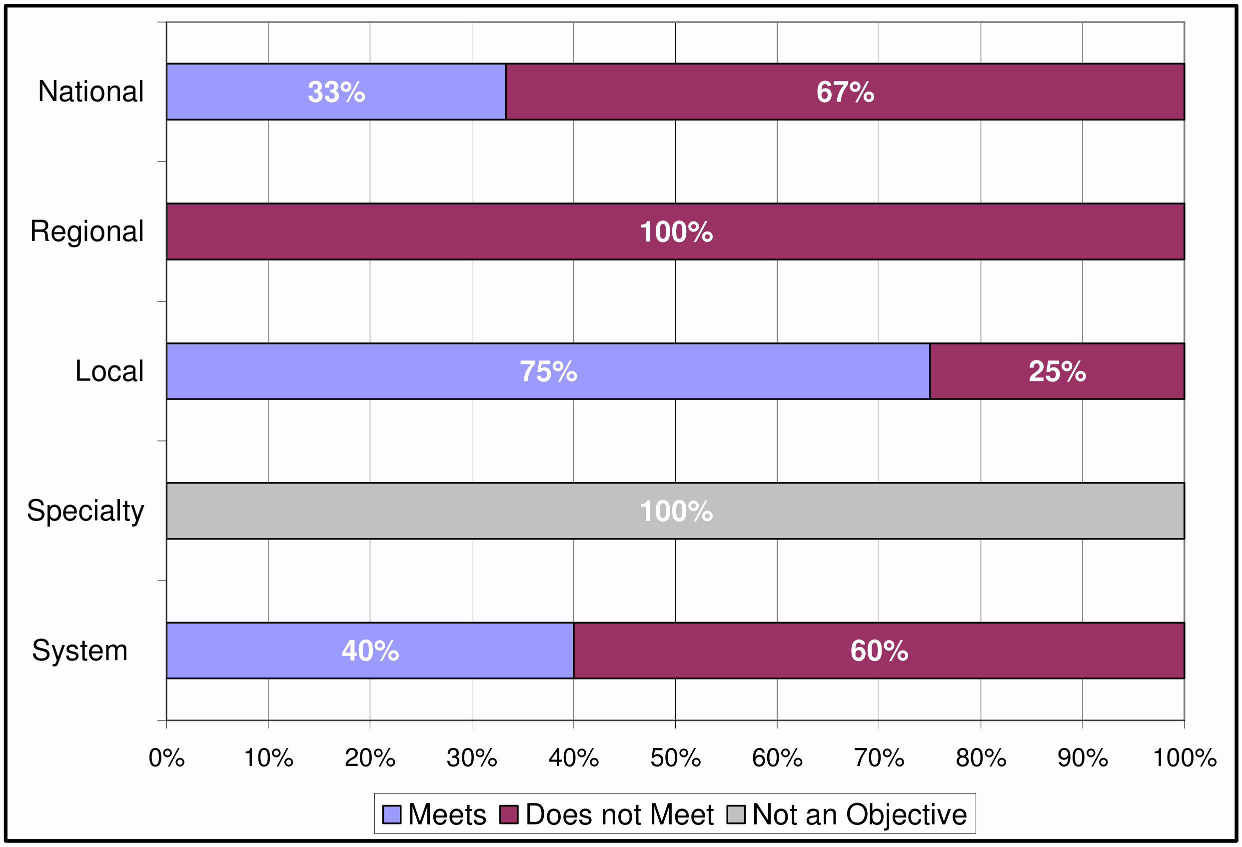
Table D-6
Performance Measure: Development
Airports Meeting Approach Objectives

Airport Name	Associated City	Current Approach	Recommended Approach	Does Not Meet
National Service				
Burlington International	Burlington	200'/1/2 Mile	Precision 200'/1/2 Mile	
Edward F. Knapp State	Barre/Montpelier	300'/1 ¼ Mile		X
Rutland State	Rutland	1,413'/1 ¼ Mile		X
Regional Service				
Hartness State	Springfield	985'/1 ¼ Mile	Non-Precision 400'/1 Mile	X
Morrisville-Stowe State	Morrisville	828'/1 Mile		X
William H. Morse State	Bennington	1,222'/1 ¼ Mile		X
Local Service				
Caledonia County State	Lyndonville	555'/ 1 Mile	Non-Precision 1,000'/3 Miles	
Franklin County State	Highgate	632'/1 Mile		
Middlebury State	Middlebury	Visual		X
Newport State	Newport	514'/1 Mile		
Specialty Service				
Basin Harbor	Vergennes		Visual Approach	
Fair Haven Municipal	Fair Haven			
John H. Boylan State	Island Pond			
Mount Snow	West Dover			
Post Mills	Post Mills			
Shelburne	Shelburne			
Warren-Sugarbush	Warren			

Source: Wilbur Smith Associates

As shown in **Exhibit D-6**, 40 percent of the system airports currently meet their approach objective. Thirty-three percent of National and 75 percent of Local Service airports meet their objective. None of the Regional Service airports meet their recommended approach.

Exhibit D-6
Performance Measure: Development
Airports Meeting Approach Objectives



Source: Wilbur Smith Associates

Benchmark: Percent of system airports meeting minimum facility and service objectives-airports meeting NAVAID objectives

Various visual and electronic Navigational Aids (NAVAIDS) provide navigational assistance to aircraft arriving and departing Vermont's airports. In order for airports to meet their recommended approach objectives, the appropriate NAVAIDS must also be in place at the airports. All National, Regional, and Local Service airports are recommended to provide the basic visual aids (rotating beacon, lighted wind cone and a segmented circle). While it is desired, but not recommended, Specialty Service airports should also provide the basic visual aids, when possible. Other visual aids provide support to precision and non-precision approach aids. These include Instrument Landing Systems (ILS) and Approach Lighting Systems (ALS) for the National Service airports. ALS is used by pilots during an instrument approach landing to align the aircraft with the centerline of the runway for the precision approach.

Other aids that support non-precision approaches include Visual Glide Slope Indicators (VGSI), which include Visual Approach Slope Indicators (VASI) and Precision Approach Path Indicators (PAPI). VGSI are recommended at Regional and Local Service airports. Due to the age and difficulty in getting parts and maintaining VASIs, it is recommended that all existing VASIs be replaced over time with newer PAPIs. National and Regional Service airports are recommended to provide VGSI and REILs and it is desired that Local Service airports also strive to provide these NAVAIDS. The NAVAID recommendations for each role are listed below:

- National Service Airports – ILS, ALS, REILs, Rotating Beacon, Lighted Wind Indicator/ Segmented Circle
- Regional Service Airports – Rotating Beacon, Lighted Wind Indicator/Segmented Circle, REILs, VGSI, Appropriate Instrument(s) for Non-Precision Approach
- Local Service Airports – Rotating Beacon, Lighted Wind Indicator/Segmented Circle, VGSI, Appropriate Instrument(s) for Non-Precision Approach
- Specialty Service Airports – Minimal Visual Aids Desirable

Table D-7 shows which airports currently meet their objectives for NAVAIDS. It is important to note that if an airport does not meet all of its NAVAIDS objectives it is recognized as not meeting the benchmark in totality.

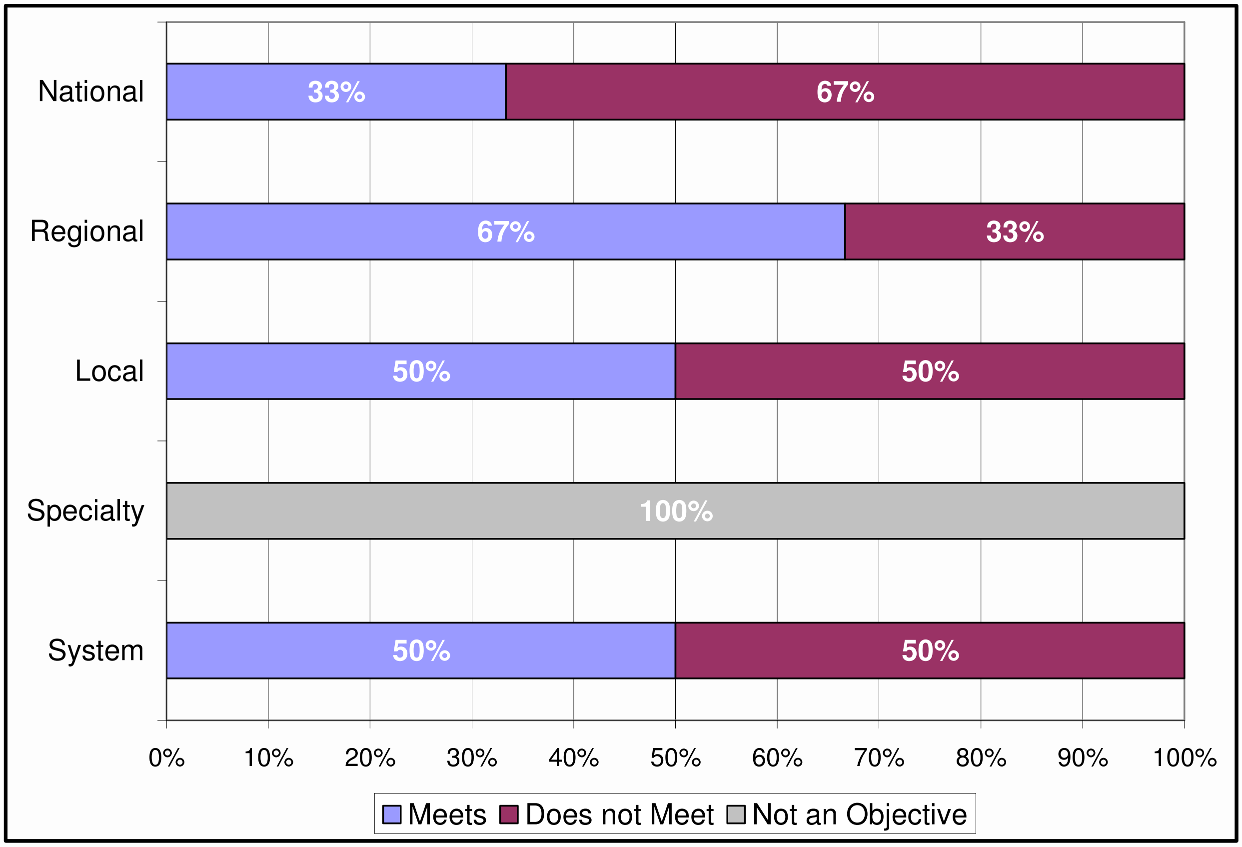
Table D-7
Performance Measure: Development
Airports Meeting NAVAIDs Objectives

Airport Name	Associated City	Meets	Does Not Meet	N/A*
National Service				
Burlington International	Burlington	X		
Edward F. Knapp State	Barre/Montpelier		X	
Rutland State	Rutland		X	
Regional Service				
Hartness State	Springfield		X	
Morrisville-Stowe State	Morrisville	X		
William H. Morse State	Bennington	X		
Local Service				
Caledonia County State	Lyndonville		X	
Franklin County State	Highgate	X		
Middlebury State	Middlebury		X	
Newport State	Newport	X		
Specialty Service				
Basin Harbor	Vergennes			X
Fair Haven Municipal	Fair Haven			X
John H. Boylan State	Island Pond			X
Mount Snow	West Dover			X
Post Mills	Post Mills			X
Shelburne	Shelburne			X
Warren-Sugarbush	Warren			X

Source: Wilbur Smith Associates
*Not Applicable-no specific objective for Specialty Service airports

As shown in **Exhibit D-7**, 50 percent of all system airports currently meet the NAVAIDS objectives benchmark. Only 33 percent of National, 67 percent of Regional, and 50 percent of Local Service airports currently meet their objectives. No specific NAVAIDS were recommended for Specialty Service airports. However, it should be noted that it is desirable that some sort of visual aid such as a rotating beacon be located at Specialty airports when applicable.

Exhibit D-7
Performance Measure: Development
Airports Meeting NAVAIDs Objectives



Source: Wilbur Smith Associates

<u>BENCHMARK: PERCENT OF SYSTEM AIRPORTS MEETING MINIMUM FACILITY AND SERVICE OBJECTIVES-AIRPORTS MEETING LIGHTING OBJECTIVES</u>

Runway lights are used to outline the edges of runways during periods of darkness or restricted visibility conditions. These light systems are classified according to the intensity or brightness they are capable of producing: High Intensity Runway Lights (HIRL), Medium Intensity Runway Lights (MIRL), and Low Intensity Runway Lights (LIRL). As established in the System Plan, the following lighting objectives were recommended for the four airport roles:

- National Service Airports – HIRL/MITL
- Regional Service Airports – MIRL/MITL
- Local Service Airports – MIRL
- Specialty Service Airports – Not an objective

Table D-8 indicates which airports are currently meeting their respective lighting objectives. It should be noted that in order to "meet" this benchmark, airports must meet both their runway and taxiway lighting objectives.

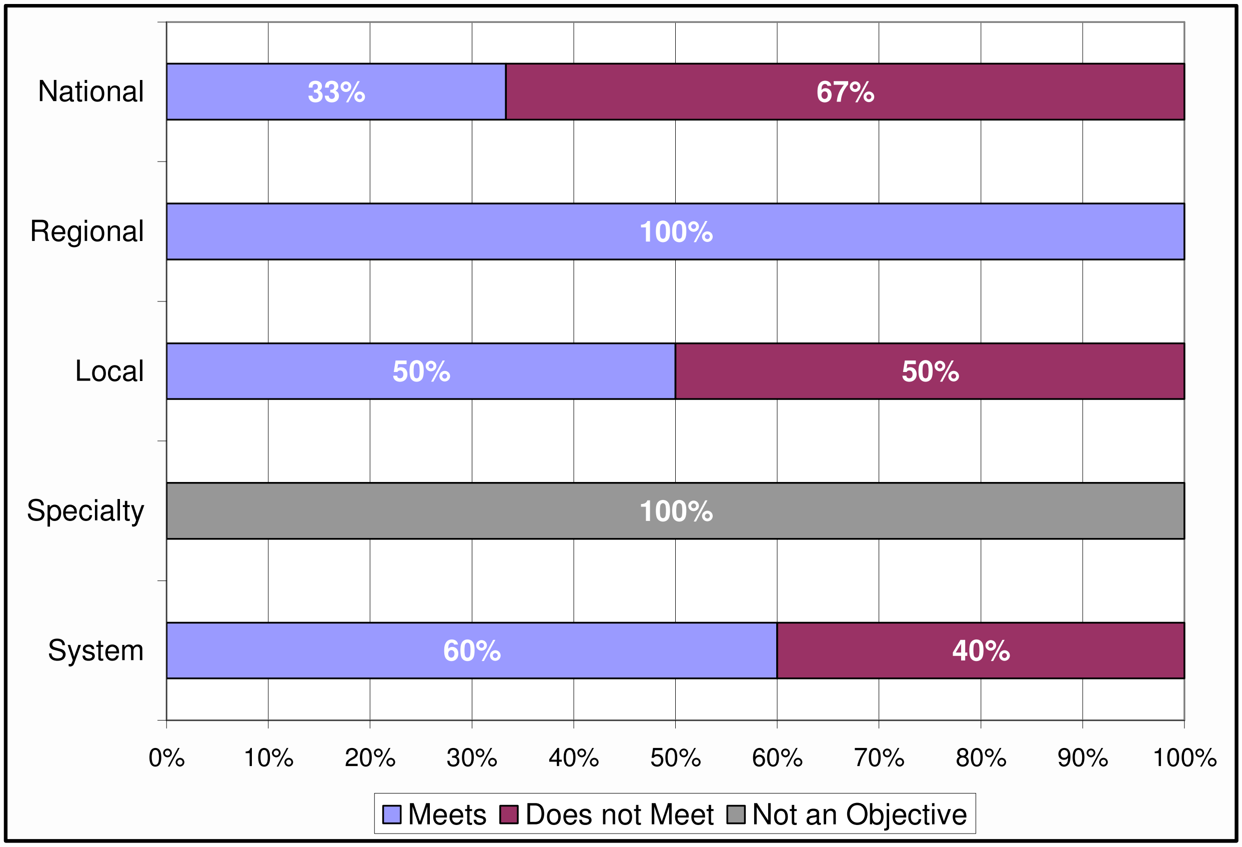
Table D-8
Performance Measure: Development
Airports Meeting Lighting Objectives

Airport Name	Associated City	Meets	Does Not Meet	N/A*
National Service				
Burlington International	Burlington	X		
Edward F. Knapp State	Barre/Montpelier		X	
Rutland State	Rutland		X	
Regional Service				
Hartness State	Springfield	X		
Morrisville-Stowe State	Morrisville	X		
William H. Morse State	Bennington	X		
Local Service				
Caledonia County State	Lyndonville		X	
Franklin County State	Highgate	X		
Middlebury State	Middlebury		X	
Newport State	Newport	X		
Specialty Service				
Basin Harbor	Vergennes			X
Fair Haven Municipal	Fair Haven			X
John H, Boylan State	Island Pond			X
Mount Snow	West Dover			X
Post Mills	Post Mills			X
Shelburne	Shelburne			X
Warren-Sugarbush	Warren			X

Source: Wilbur Smith Associates
*Not Applicable- no specific objective for Specialty Service airports

As shown in **Exhibit D-8**, 33 percent of National, 100 percent of Regional, and 50 percent of Local Service airports currently meet their lighting benchmark. While Specialty Service airports are only desired to provide lighting, it should be noted that Mount Snow Airport provides LIRL. Overall, 60 percent of the Vermont system airports meet their recommended lighting objectives.

Exhibit D-8
Performance Measure: Development
Airports Meeting Lighting Objectives



Source: Wilbur Smith Associates

BENCHMARK: PERCENT OF SYSTEM AIRPORTS MEETING MINIMUM FACILITY AND SERVICE OBJECTIVES-AIRPORTS MEETING WEATHER REPORTING OBJECTIVES

On-site weather reporting equipment at an airport can complement that facility's precision or non-precision approach capabilities, as well as promote an increased safety margin during periods of inclement or changing weather. For this benchmark, all airport roles except Specialty Service were recommended to have automated weather reporting, either through an automated surface observing system (ASOS) or an automated weather observing system (AWOS). All airports are recommended to have a Pilot Weather Briefing System (PWBS) in operation.

Table D-9 indicates which airports, by role, are currently meeting their objectives.

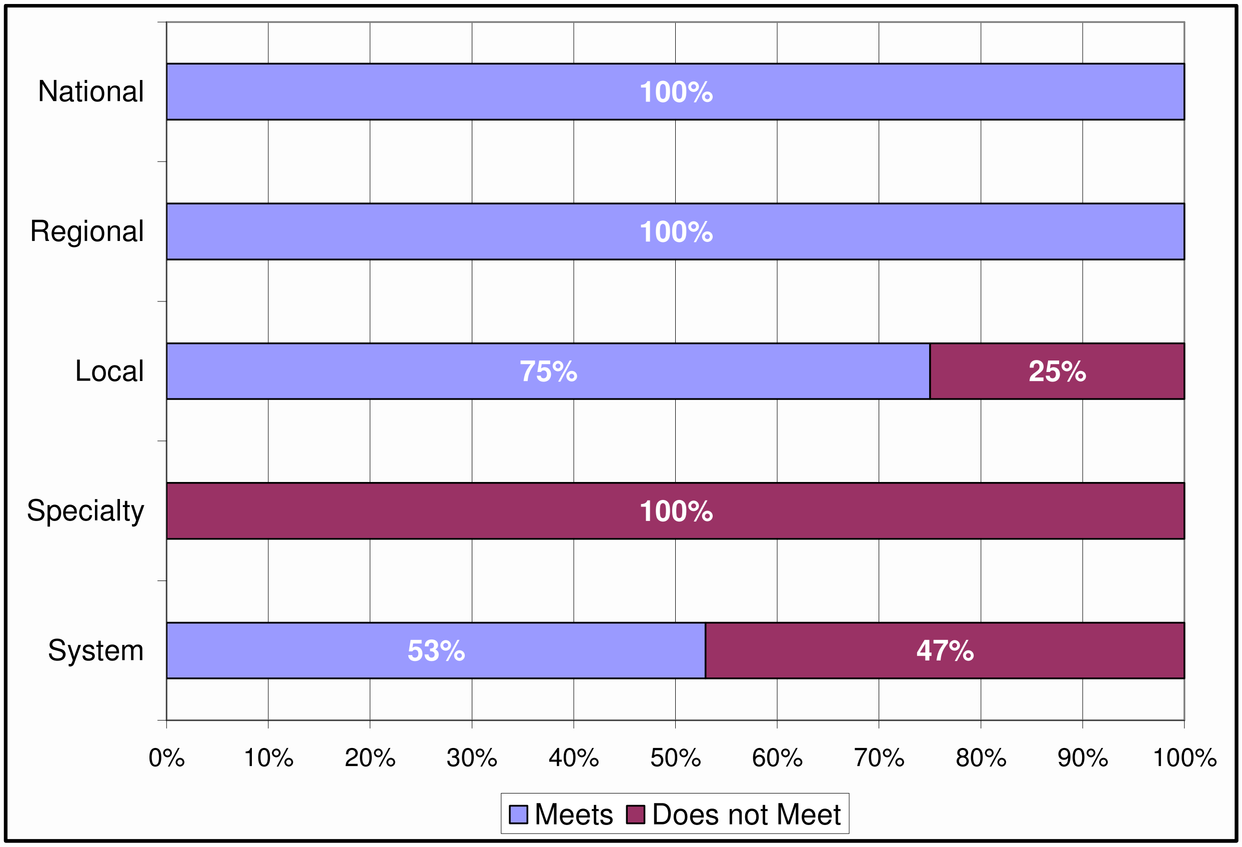
Table D-9
Performance Measure: Development
Airports Meeting Weather Reporting Objectives

Airport Name	Associated City	Meets	Does Not Meet
National Service			
Burlington International	Burlington	X	
Edward F, Knapp State	Barre/Montpelier	X	
Rutland State	Rutland	X	
Regional Service			
Hartness State	Springfield	X	
Morrisville-Stowe State	Morrisville	X	
William H. Morse State	Bennington	X	
Local Service			
Caledonia County State	Lyndonville	X	
Franklin County State	Highgate	X	
Middlebury State	Middlebury		X
Newport State	Newport	X	
Specialty Service			
Basin Harbor	Vergennes		X
Fair Haven Municipal	Fair Haven		X
John H, Boylan State	Island Pond		X
Mount Snow	West Dover		X
Post Mills	Post Mills		X
Shelburne	Shelburne		X
Warren-Sugarbush	Warren		X

Source: Wilbur Smith Associates

Exhibit D-9 shows that 53 percent of airports that are required to have an on-site weather reporting system currently meet their objectives. One-hundred percent of National and Regional Service airports meet their recommended objectives. Seventy-five percent of Local Service airports meet their weather reporting objectives. None of the Specialty Service airports meet their objective, which are recommended to have a PWBS on-site.

Exhibit D-9
Performance Measure: Development
Airports Meeting Weather Reporting Objectives



Source: Wilbur Smith Associates

<u>**BENCHMARK: PERCENT OF SYSTEM AIRPORTS MEETING MINIMUM FACILITY AND SERVICE OBJECTIVES-AIRPORTS MEETING GROUND COMMUNICATIONS OBJECTIVES**</u>

In addition to airports providing public telephone service, ground communication outlets (GCO), and remote communication outlets (RCO) are another communications service that airports can provide. Pilots at uncontrolled airports may contact Air Traffic Control (ATC) and/or Flight Service Stations (FSS) via VHF to a telephone connection to obtain an instrument clearance or close a VFR or IFR flight plan. They may also get an updated weather briefing prior to takeoff. Pilots use four "key clicks" on the VHF radio to contact the appropriate ATC facility or six "key clicks" to contact the FSS. The GCO system is intended to be used only on the ground. RCOs also permits clear radio communications with air traffic personnel and Flight Service Stations serving the airport. Both services increase the safety, convenience, and the efficiency of both pilots and the airport. For the Vermont Airport System Plan, the following objectives were established for each airport role to provide sufficient ground communications:

- National Service Airports – Public phone, GCO or RCO
- Regional Service Airports – Public phone, GCO or RCO
- Local Service Airports – Public phone, GCO or RCO as needed
- Specialty Service Airports – Public phone, GCO or RCO as needed

Using the facility objectives, each study airport was reviewed to determine the ability of current ground communication services to meet study objectives. The results are depicted in **Table D-10**. It should be noted that in order for an airport to meet its objective it must meet it in its entirety.

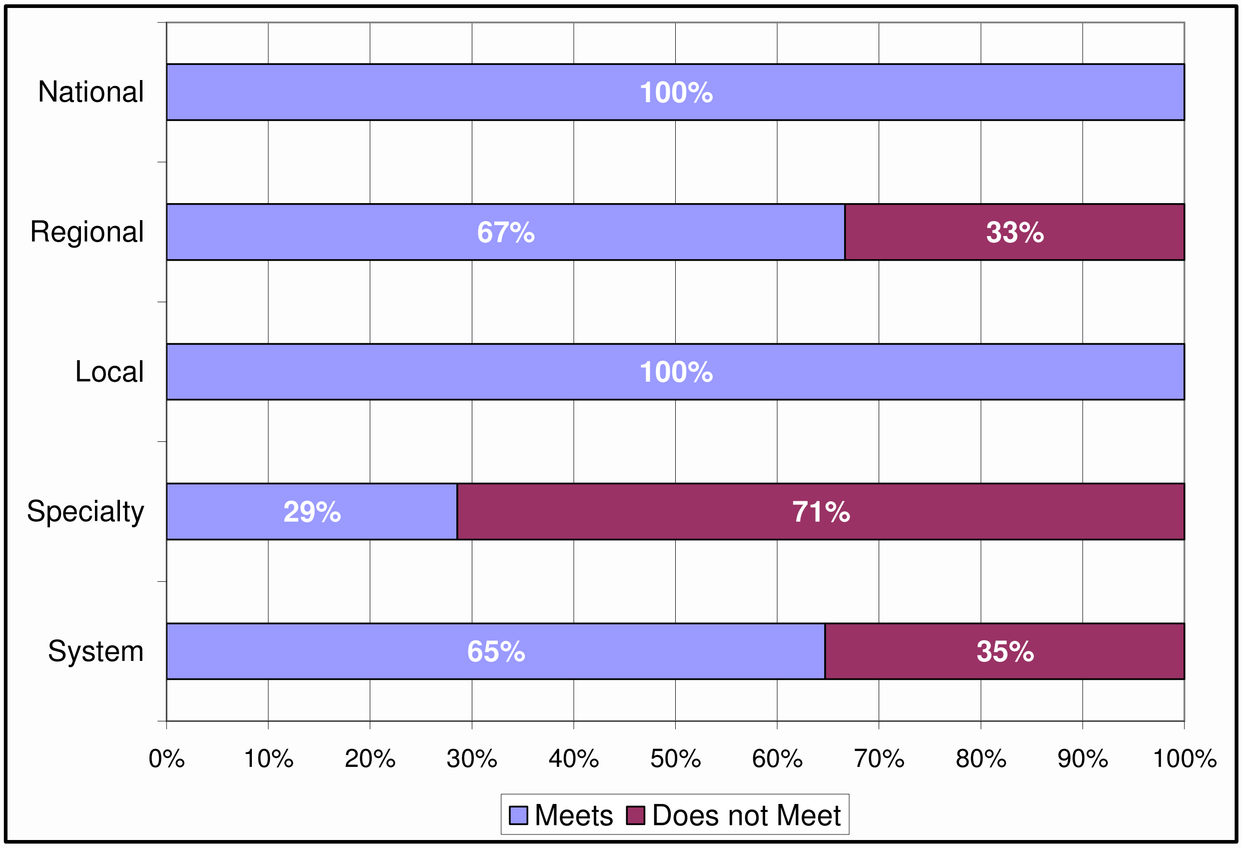
Table D-10
Performance Measure: Development
Airports Meeting Ground Communications Objectives

Airport Name	Associated City	Meets	Does Not Meet
National Service			
Burlington International	Burlington	X	
Edward F. Knapp State	Barre/Montpelier	X	
Rutland State	Rutland	X	
Regional Service			
Hartness State	Springfield		X
Morrisville-Stowe State	Morrisville	X	
William H. Morse State	Bennington	X	
Local Service			
Caledonia County State	Lyndonville	X	
Franklin County State	Highgate	X	
Middlebury State	Middlebury	X	
Newport State	Newport	X	
Specialty Service			
Basin Harbor	Vergennes		X
Fair Haven Municipal	Fair Haven		X
John H. Boylan State	Island Pond		X
Mount Snow	West Dover		X
Post Mills	Post Mills		X
Shelburne	Shelburne	X	
Warren-Sugarbush	Warren	X	

Source: Wilbur Smith Associates

Exhibit D-10 shows that currently, 100 percent of National, 67 percent of Regional, 100 percent of Local, and 29 percent of Specialty Service airports meet their objective for the ground communications benchmark. It should be noted that at Burlington International, there is no need for an RCO or GCO since the airport has an Air Traffic Control Tower (ATCT). As a result, direct communications can be made with the tower which results in the airport meeting this objective. Overall, 65 percent of Vermont's system airports meet their ground communications objectives.

Exhibit D-10
Performance Measure: Development
Airports Meeting Ground Communications Objectives



Source: Wilbur Smith Associates

Benchmark: Percent of system airports meeting minimum facility and service objectives-airports meeting covered storage objectives

The need to provide covered storage for based aircraft varies by airport, climate, aircraft cost, security, and other considerations. Nationally, there is a growing trend for owners of general aviation aircraft to seek covered storage. As recommended in Chapter Five, the following hangar storage objectives were established for the four airport roles:

- National Service Airports – 70% of based aircraft
- Regional Service Airports – 70% of based aircraft
- Local Service Airports – 60% of based aircraft
- Specialty Service Airports – Maintain existing facilities

A comparison of current hangar space at all airports to the amount of space that would be required to provide covered storage to the specified percentage of based aircraft at an airport was performed. This comparison provides a general assessment of the adequacy of existing hangar space. This information summarized in **Table D-11** indicates by airport role, whether or not each airport currently meets its facility objectives for covered storage.

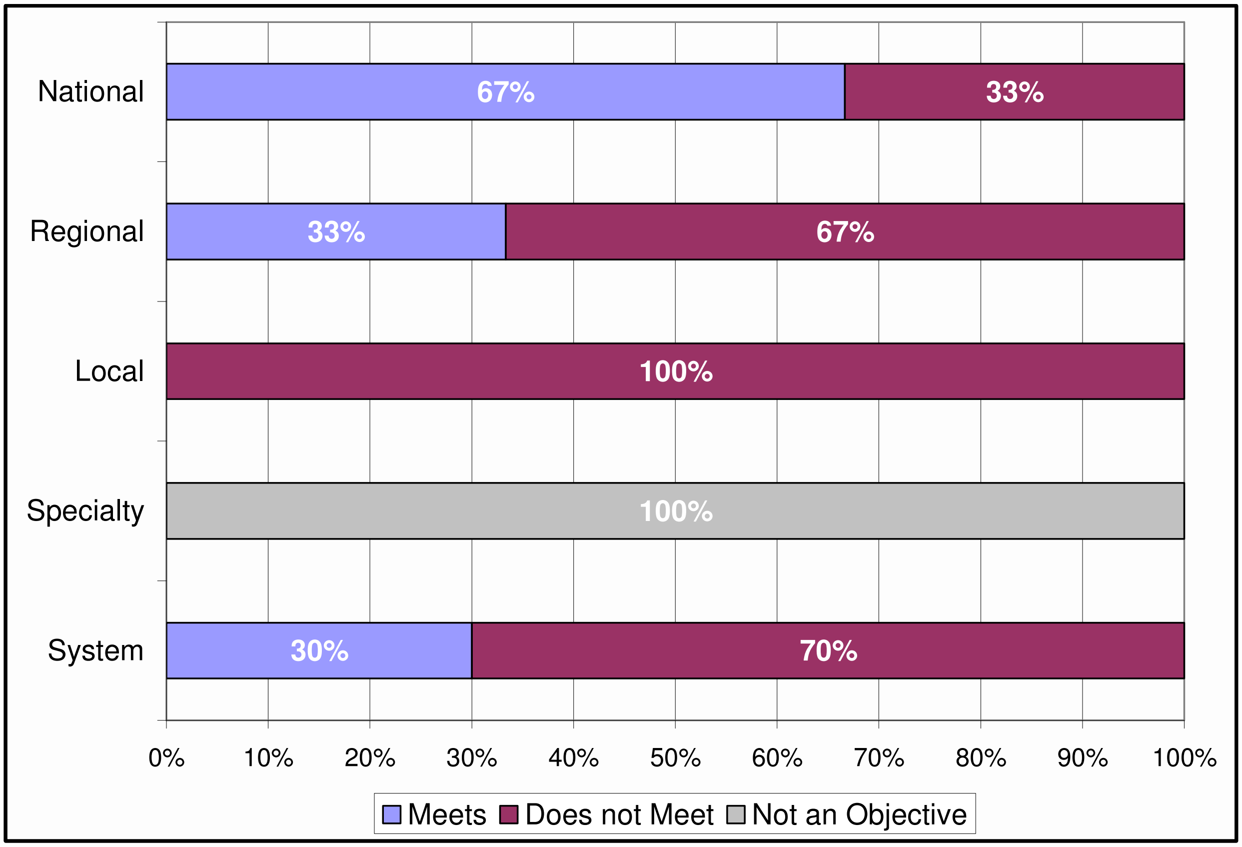
Table D-11
Performance Measure: Development
Airports Meeting Covered Storage Objectives

Airport Name	Associated City	Current Storage (sq. ft)	Recommended Storage (sq. ft.)	Does Not Meet
National Service				
Burlington International	Burlington	99,200	66,150	
Edward F. Knapp State	Barre/Montpelier	40,515	63,000	X
Rutland State	Rutland	51,790	43,050	
Regional Service				
Hartness State	Springfield	29,300	38,850	X
Morrisville-Stowe State	Morrisville	25,000	29,400	X
William H. Morse State	Bennington	58,300	52,500	
Local Service				
Caledonia County State	Lyndonville	10,000	17,100	X
Franklin County State	Highgate	45,000	47,700	X
Middlebury State	Middlebury	37,300	45,000	X
Newport State	Newport	15,000	15,300	X
Specialty Service				
Basin Harbor	Vergennes		Maintain Existing	
Fair Haven Municipal	Fair Haven			
John H. Boylan State	Island Pond			
Mount Snow	West Dover			
Post Mills	Post Mills			
Shelburne	Shelburne			
Warren-Sugarbush	Warren			

Source: Wilbur Smith Associates

Exhibit D-11 shows that for the aircraft storage benchmark, 67 percent of National, and only 33 percent of Regional Service airports currently meet their objective for covered storage for based aircraft. None of the airports in the Local Service role currently meet their recommended amount of covered storage. Specialty Service airports are recommended to maintain their existing hangar facilities. 30 percent of all system airports now meet the Vermont Airport System Plan's aircraft storage objective. It should be noted that if additional hangars are not provided between now and the end of the 20-year planning period, the system-wide compliance rating for the covered storage objective will decrease. Facilities needed to address current and future shortfalls will be identified in a subsequent chapter of this document.

Exhibit D-11
Performance Measure: Development
Airports Meeting Covered Storage Objectives



Source: Wilbur Smith Associates

BENCHMARK: PERCENT OF SYSTEM AIRPORTS MEETING MINIMUM FACILITY AND SERVICE OBJECTIVES-AIRPORTS MEETING AIRCRAFT APRON OBJECTIVES

As discussed in Chapter Five, the amount of apron space at an airport should relate to the number of based aircraft not in covered storage and the busiest daily transient aircraft activity. The following apron space objectives were established for the four airport roles:

- National Service Airports – 30% of based aircraft plus an additional 75% for transient aircraft
- Regional Service Airports – 30% of based aircraft plus an additional 50% for transient aircraft

- Local Service Airports – 40% of based aircraft plus an additional 25% for transient aircraft
- Specialty Service Airports – Maintain existing facilities

Using the facility objectives, each study airport was reviewed to determine the ability of current aircraft apron parking facilities to meet study objectives. The results are depicted in **Table D-12**.

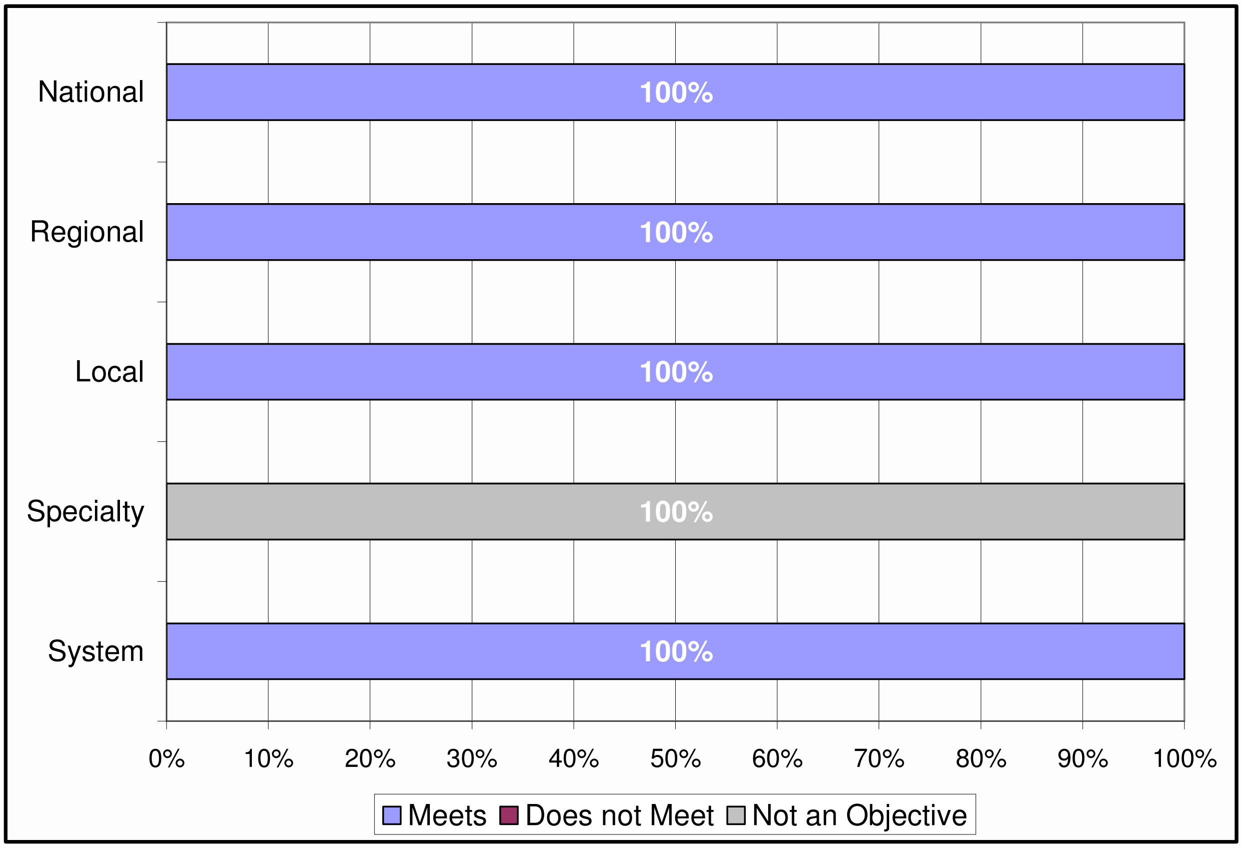
Table D-12
Performance Measure: Development
Airports Meeting Aircraft Apron Objectives

Airport Name	Associated City	Current Apron Space (square yards)	Recommended Apron Space (square yards)	Does Not Meet
National Service				
Burlington International	Burlington	65,478	19,800	
Edward F. Knapp State	Barre/Montpelier	16,000	12,700	
Rutland State	Rutland	37,000	12,400	
Regional Service				
Hartness State	Springfield	25,000	4,300	
Morrisville-Stowe State	Morrisville	8,200	4,400	
William H. Morse State	Bennington	12,500	8,600	
Local Service				
Caledonia County State	Lyndonville	6,900	2,500	
Franklin County State	Highgate	19,000	7,600	
Middlebury State	Middlebury	15,000	7,400	
Newport State	Newport	15,000	2,400	
Specialty Service				
Basin Harbor	Vergennes		Maintain Existing	
Fair Haven Municipal	Fair Haven			
John H. Boylan State	Island Pond			
Mount Snow	West Dover			
Post Mills	Post Mills			
Shelburne	Shelburne			
Warren-Sugarbush	Warren			

Source: Wilbur Smith Associates

Exhibit D-12 shows that currently, 100 percent of National, Regional, and Local Service airports meet their objective for the aircraft apron benchmark. For those airports in the National Service role that have commercial passenger service, only general aviation apron space was analyzed. It should be noted that this analysis assumes that the based aircraft storage objectives for each role are being met. Only 30 percent of the system airports meet their based aircraft storage objective, which means that in order for airports to actually have enough apron space to comply with this objective, the based aircraft objective will also have to be met. As a result, T-hangars or conventional hangars would be required to be built over the course of the planning period in order for the apron space objective to be met.

Exhibit D-12
Performance Measure: Development
Airports Meeting Aircraft Apron Objectives



Source: Wilbur Smith Associates

BENCHMARK: PERCENT OF SYSTEM AIRPORTS MEETING MINIMUM FACILITY AND SERVICE OBJECTIVES-AIRPORTS MEETING TERMINAL/ADMINISTRATION BUILDING OBJECTIVES

Typically, general aviation terminal/administration buildings are planned to serve the total number of peak hour operations/passengers. General aviation buildings may serve many different roles, depending on the complexity of the airport. The Vermont Airport System Plan has identified different terminal/administrative building facility objectives for each airport role and they are as follows:

- National Service Airports – At a minimum, 2,500 square feet of public space
- Regional Service Airports – At a minimum, 2,500 square feet of public space
- Local Service Airports – At a minimum, 1,500 square feet of public space

- Specialty Service Airports – Maintain existing facilities, minimal service terminal/building desirable

Each study airport was reviewed to determine the ability of its general aviation terminal/administrative building to meet these objectives. The results are depicted in **Table D-13**. As shown in Table D-13, several airports are currently not meeting their general aviation terminal/administrative building facility objective.

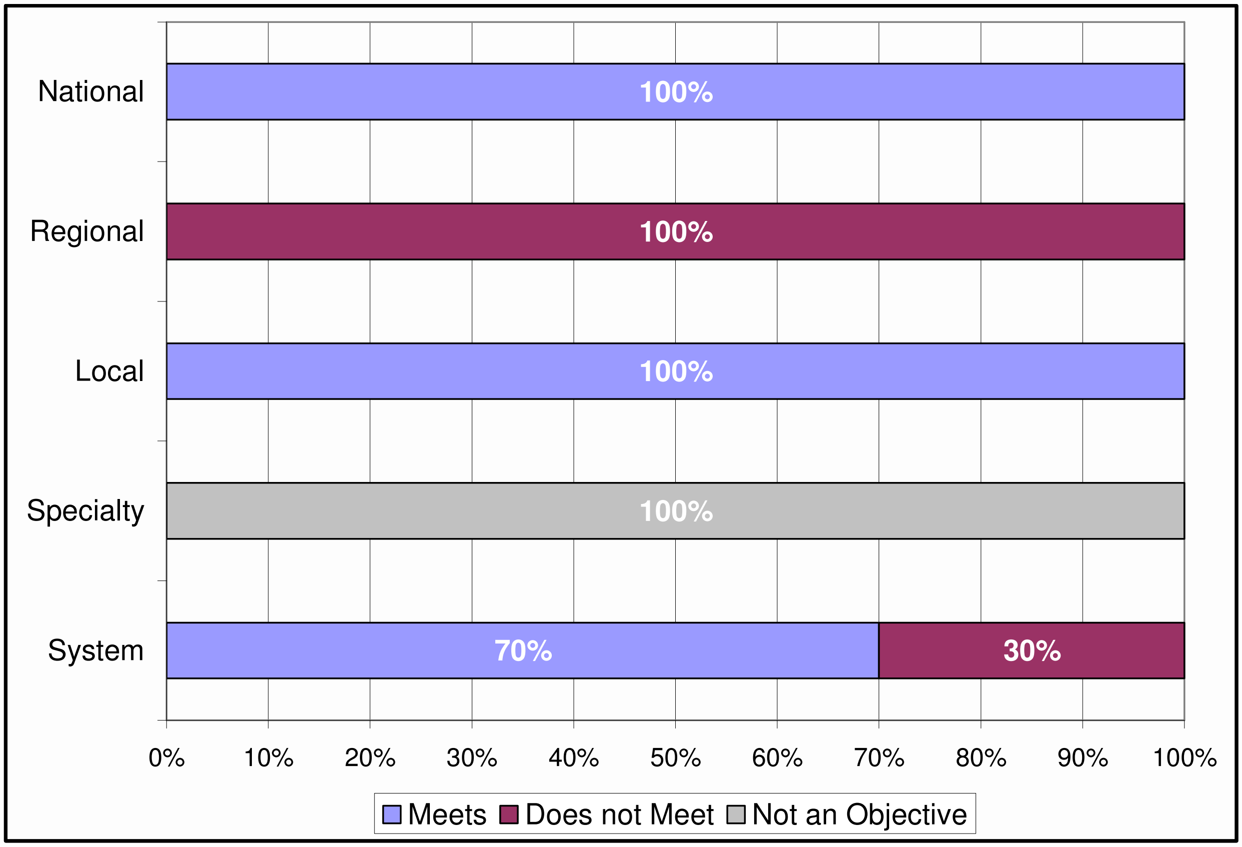
Table D-13
Performance Measure: Development
Airports Meeting Terminal/Administration Building Objectives

Airport Name	Associated City	Current Terminal (sq. ft.)	Recommended Terminal (sq. ft.)	Does Not Meet
National Service				
Burlington International	Burlington	20,800	2,500 sq. ft.	
Edward F. Knapp State	Barre/Montpelier	4,680		
Rutland State	Rutland	3,780		
Regional Service				
Hartness State	Springfield	2,000	2,500 sq. ft.	X
Morrisville-Stowe State	Morrisville	1,300		X
William H. Morse State	Bennington	2,000		X
Local Service				
Caledonia County State	Lyndonville	1,500	1,500 sq. ft.	
Franklin County State	Highgate	2,000		
Middlebury State	Middlebury	5,400		
Newport State	Newport	1,500		
Specialty Service				
Basin Harbor	Vergennes		Maintain Existing	
Fair Haven Municipal	Fair Haven			
John H. Boylan State	Island Pond			
Mount Snow	West Dover			
Post Mills	Post Mills			
Shelburne	Shelburne			
Warren-Sugarbush	Warren			

Source: Wilbur Smith Associates

Exhibit D-13 shows that 100 percent of National and Local Service airports meet their objective for the general aviation terminal/administrative building. None of the airports in the Regional Service role meet their objective. Provision of a general aviation terminal/administrative building was not an objective for the Specialty Service airports.

Exhibit D-13
Performance Measure: Development
Airports Meeting Terminal/Administration Building Objectives



Source: Wilbur Smith Associates

BENCHMARK: PERCENT OF SYSTEM AIRPORTS MEETING MINIMUM FACILITY AND SERVICE OBJECTIVES-AIRPORTS MEETING FENCING OBJECTIVES

Various types of fencing are available for the different types of airports and their necessity for additional security. By either fencing the entire perimeter or even the airfield operations area at a minimum, a certain level of security is provided as it serves as a deterrent to a potential intruder. In addition, fencing also acts as a means of wildlife control, keeping animals off of runways and taxiways, which aids in preventing accidents and limits the potential for damage to aircraft. The following fencing objectives have been recommended:

- National Service Airports – Entire Airport
- Regional Service Airports – Entire Airport
- Local Service Airports – Operations Area at Minimum
- Specialty Service Airports – Operations Area at Minimum

Table D-14 shows that only Burlington International and Rutland State, which are in the National Service role, currently meet their fencing objectives.

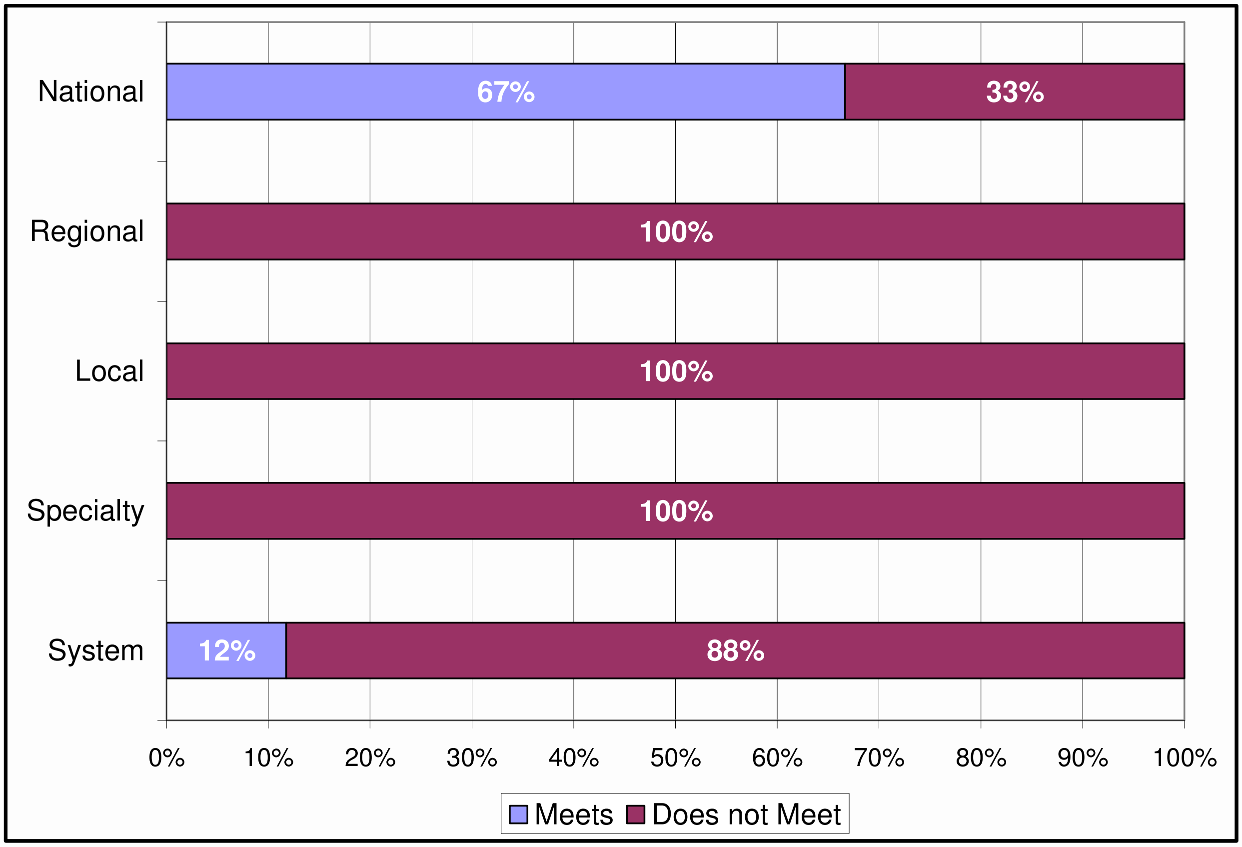
Table D-14
Performance Measure: Development
Airports Meeting Fencing Objectives

Airport Name	Associated City	Current Fencing	Recommended Fencing	Does Not Meet
National Service				
Burlington International	Burlington	Entire Airport	Entire Airport	
Edward F. Knapp State	Barre/Montpelier	Partial		X
Rutland State	Rutland	Entire Airport		
Regional Service				
Hartness State	Springfield	Partial	Entire Airport	X
Morrisville-Stowe State	Morrisville	Partial		X
William H. Morse State	Bennington	Partial		X
Local Service				
Caledonia County State	Lyndonville	Partial	Operations Area at Minimum	X
Franklin County State	Highgate	Partial		X
Middlebury State	Middlebury	Partial		X
Newport State	Newport	Partial		X
Specialty Service				
Basin Harbor	Vergennes	None	Operations Area at Minimum	X
Fair Haven Municipal	Fair Haven	None		X
John H. Boylan State	Island Pond	None		X
Mount Snow	West Dover	None		X
Post Mills	Post Mills	None		X
Shelburne	Shelburne	None		X
Warren-Sugarbush	Warren	None		X

Source: Wilbur Smith Associates

As shown in **Exhibit D-14**, none of the airports in the other roles meet their fencing objectives.

Exhibit D-14
Performance Measure: Development
Airports Meeting Fencing Objectives



Source: Wilbur Smith Associates

BENCHMARK: PERCENT OF SYSTEM AIRPORTS MEETING MINIMUM FACILITY AND SERVICE OBJECTIVES-AIRPORTS MEETING AUTO PARKING OBJECTIVES

An airport's need for general aviation-related automobile parking is driven by the number of owners basing planes at the airport, on-airport employment, and other factors. For the Vermont Airport System Plan, the following objectives were established for each airport role to provide sufficient auto parking:

- National Service Airports – 1 space for each based aircraft plus 50% for employees/visitors
- Regional Service Airports – 1 space for each based aircraft plus 50% for employees/visitors
- Local Service Airports – 1 space for each based aircraft plus 25% for employees/visitors
- Specialty Service Airports – Maintain existing facilities

It is often difficult to accurately identify the number of "actual" spaces available for general aviation-related auto parking. Many smaller general aviation airports often have unpaved auto parking areas. At some airports, it is not uncommon for aircraft owners to park their cars in their hangar when they are flying their plane. As a result of the events on September 11, 2001, new security guidelines for commercial and general aviation airports may result in restricted auto parking in aircraft movement areas. Airports should therefore plan to provide auto parking in designated areas away from hangars and other areas of aircraft movement.

Using the facility objectives developed as part of this analysis, each study airport was reviewed to determine the ability of current auto parking facilities to meet study objectives. The results are depicted in **Table D-15**.

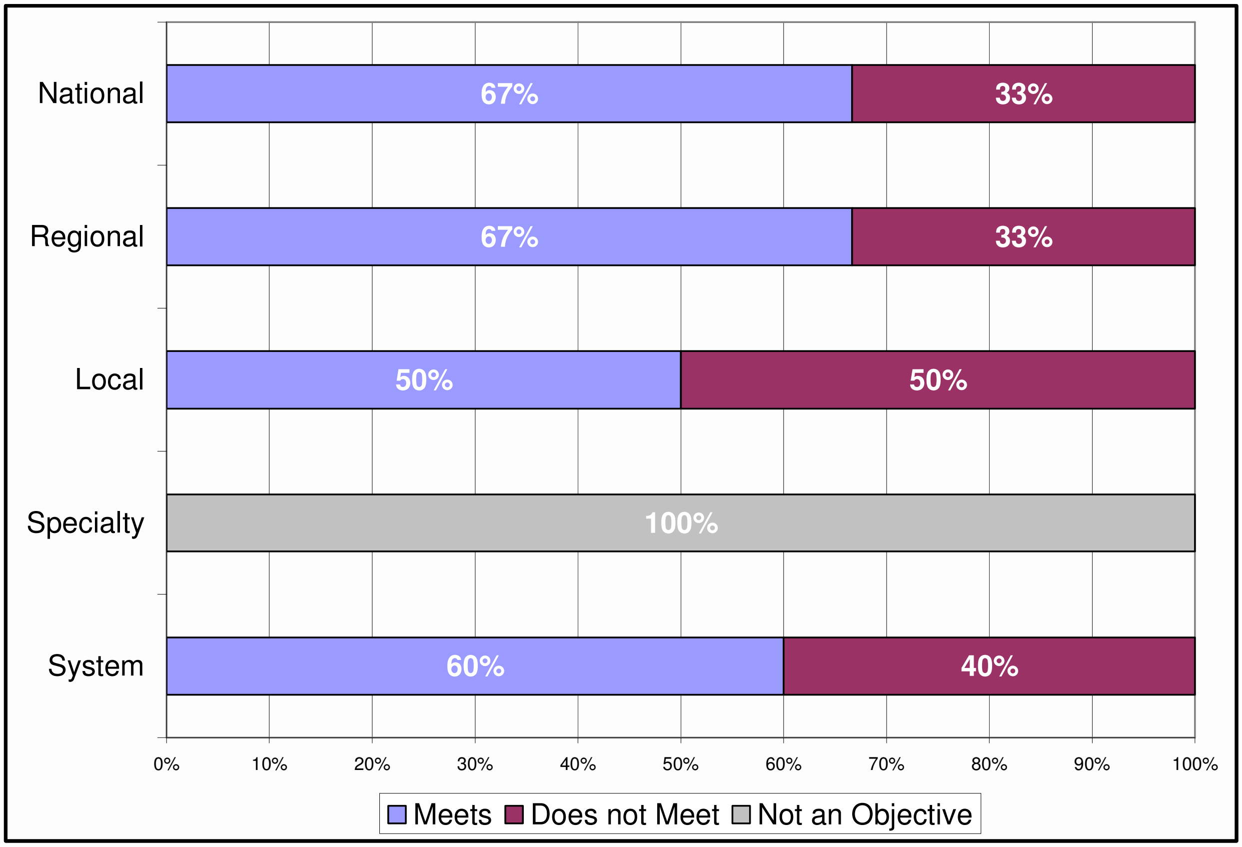
Table D-15
Performance Measure: Development
Airports Meeting Auto Parking Objectives

Airport Name	Associated City	Current Auto Parking	Recommended Auto Parking	Does Not Meet
National Service				
Burlington International	Burlington	100	95	
Edward F. Knapp State	Barre/Montpelier	50	90	X
Rutland State	Rutland	100	62	
Regional Service				
Hartness State	Springfield	75	56	
Morrisville-Stowe State	Morrisville	50	42	
William H. Morse State	Bennington	50	75	X
Local Service				
Caledonia County State	Lyndonville	15	24	X
Franklin County State	Highgate	50	66	X
Middlebury State	Middlebury	72	63	
Newport State	Newport	30	21	
Specialty Service				
Basin Harbor	Vergennes		Maintain Existing	
Fair Haven Municipal	Fair Haven			
John H. Boylan State	Island Pond			
Mount Snow	West Dover			
Post Mills	Post Mills			
Shelburne	Shelburne			
Warren-Sugarbush	Warren			

Source: Wilbur Smith Associates

Exhibit D-15 shows that 67 percent of National, 67 percent of Regional, and 50 percent of Local Service airports currently meet their auto parking objectives. Again, Specialty Service airports are only required to maintain their existing facilities. It should be noted that auto parking needs were only analyzed related to general aviation and not airline passenger needs at commercial service airports.

Exhibit D-15
Performance Measure: Development
Airports Meeting Auto Parking Objectives



Source: Wilbur Smith Associates

BENCHMARK: PERCENT OF SYSTEM AIRPORTS MEETING MINIMUM FACILITY AND SERVICE OBJECTIVES-AIRPORTS MEETING FUEL OBJECTIVES

The relationship between fuel and aviation operations underscores the need for fuel service at any airport. Airports should, and typically do, supply the types of fuel that their users need. National Service airports for example, which accommodate demanding aircraft such as business jets, should have jet fuel available for sale. In addition, fuel sales should be made accessible related to the demand by its users. An increasing number of GA airports nationwide, including several in Vermont; have installed self-service fuel farms by which a pilot can operate with a credit card, making fuel available at an airport 24 hours a day. This makes fueling an aircraft quicker and more accessible. Listed below are the recommendations for the types of fuel each airport role should offer:

- National Service Airports – Self Service AvGas and Jet A
- Regional Service Airports – Self Service AvGas and Jet A
- Local Service Airports - Self Service AvGas; Jet A as needed
- Specialty Service Airports – AvGas; Jet A as needed

Using the facility objectives, each study airport was reviewed to determine the ability of current fueling facilities to meet study objectives. The results are depicted in **Table D-16**.

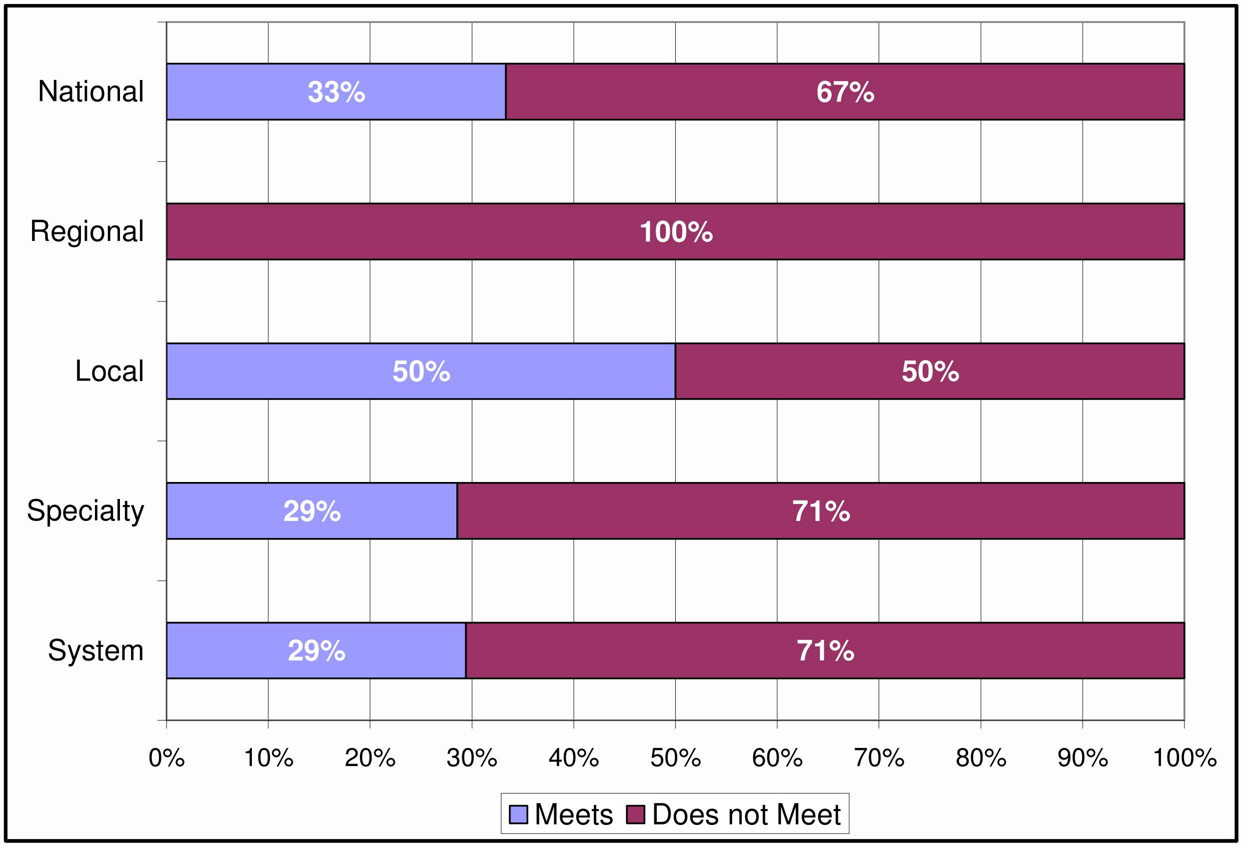
Table D-16
Performance Measure: Development
Airports Meeting Fuel Objectives

Airport Name	Associated City	Current Fueling Facilities	Recommended Fueling Facilities	Does Not Meet
National Service				
Burlington International	Burlington	AvGas, JetA	Self Serve AvGas and Jet A	X
Edward F. Knapp State	Barre/Montpelier	AvGas, JetA		X
Rutland State	Rutland	Self Serve AvGas,		
Regional Service				
Hartness State	Springfield	Self Serve AvGas,	Self Serve AvGas and Jet A	X
Morrisville-Stowe State	Morrisville	AvGas, JetA		X
William H. Morse State	Bennington	Self Serve AvGas,		X
Local Service				
Caledonia County State	Lyndonville	Self Serve AvGas	Self Serve AvGas; Jet A as Needed	
Franklin County State	Highgate	AvGas		X
Middlebury State	Middlebury	Self Serve AvGas		
Newport State	Newport	AvGas, JetA		X
Specialty Service				
Basin Harbor	Vergennes	None	AvGas, Jet A as Needed	X
Fair Haven Municipal	Fair Haven	None		X
John H. Boylan State	Island Pond	None		X
Mount Snow	West Dover	Self Serve AvGas		
Post Mills	Post Mills	None		X
Shelburne	Shelburne	MoGas		X
Warren-Sugarbush	Warren	Self Serve AvGas		

Source: Wilbur Smith Associates

System wide, only 29 percent of airports are meeting their fueling objectives, as shown in **Exhibit D-16**. Currently, 33 percent of National, 50 percent of Local, and 29 percent of Specialty Service airports meet their objective for the fueling benchmark. None of the airports in the Regional Service role meet their fuel objective.

Exhibit D-16
Performance Measure: Development
Airports Meeting Fuel Objectives



Source: Wilbur Smith Associates

<u>BENCHMARK: PERCENT OF SYSTEM AIRPORTS MEETING MINIMUM FACILITY AND SERVICE OBJECTIVES-AIRPORTS MEETING FBO OBJECTIVES</u>

A Fixed Base Operator (FBO) is a local airport business which provides aviation services at an airport. Services provided are basic aeronautical services such as fuel sales, flying instruction, Exhibiter flights, and aircraft maintenance. For the Vermont Airport System Plan, the following objectives were established for each airport role to provide sufficient FBO services:

- National Service Airports – Full Service
- Regional Service Airports – Full Service
- Local Service Airports – Limited Service
- Specialty Service Airports – Limited Service

Using the facility objectives, each study airport was reviewed to determine the ability of current FBO services to meet study objectives. The results are depicted in **Table D-17**.

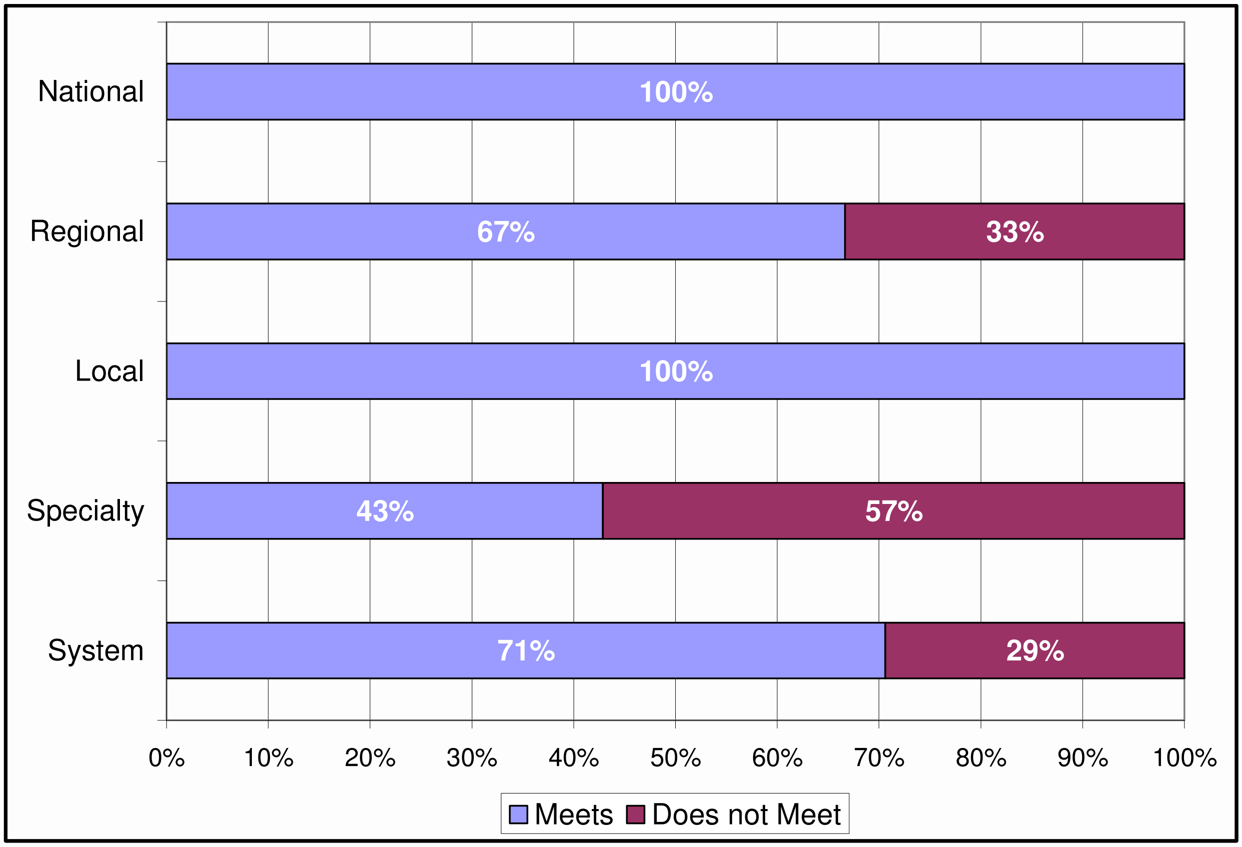
Table D-17
Performance Measure: Development
Airports Meeting FBO Objectives

Airport Name	Associated City	Meets	Does Not Meet
National Service			
Burlington International	Burlington	X	
Edward F. Knapp State	Barre/Montpelier	X	
Rutland State	Rutland	X	
Regional Service			
Hartness State	Springfield	X	
Morrisville-Stowe State	Morrisville	X	
William H. Morse State	Bennington		X
Local Service			
Caledonia County State	Lyndonville	X	
Franklin County State	Highgate	X	
Middlebury State	Middlebury	X	
Newport State	Newport	X	
Specialty Service			
Basin Harbor	Vergennes		X
Fair Haven Municipal	Fair Haven		X
John H. Boylan State	Island Pond		X
Mount Snow	West Dover	X	
Post Mills	Post Mills		X
Shelburne	Shelburne	X	
Warren-Sugarbush	Warren	X	

Source: Wilbur Smith Associates

System wide, 71 percent of Vermont's public use airports are meeting their FBO objectives, as shown in **Exhibit D-17**. Currently, 100 percent of National and Local Service airports meet their FBO objective. Sixty-seven percent of Regional Service airports and 43 percent of Specialty Service airports meet their objective for the FBO benchmark.

Exhibit D-17
Performance Measure: Development
Airports Meeting FBO Objectives



Source: Wilbur Smith Associates

<u>BENCHMARK: PERCENT OF SYSTEM AIRPORTS MEETING MINIMUM FACILITY AND SERVICE OBJECTIVES-AIRPORTS MEETING AIRCRAFT MAINTENANCE OBJECTIVES</u>

Aircraft maintenance is an important service that airports can provide that is beneficial to all vested members of the aviation community whether on the local, regional, or national level. This service is yet another mechanism that airports use to be self-sufficient while conducting business and adding jobs to the economic base of the local community, region, and state. The type of on-airport maintenance recommended for each of the roles is:

- National Service Airports – Full Service
- Regional Service Airports – Full Service
- Local Service Airports – Limited Service
- Specialty Service Airports – Not an objective

Table D-18 shows which airports meet their maintenance objective.

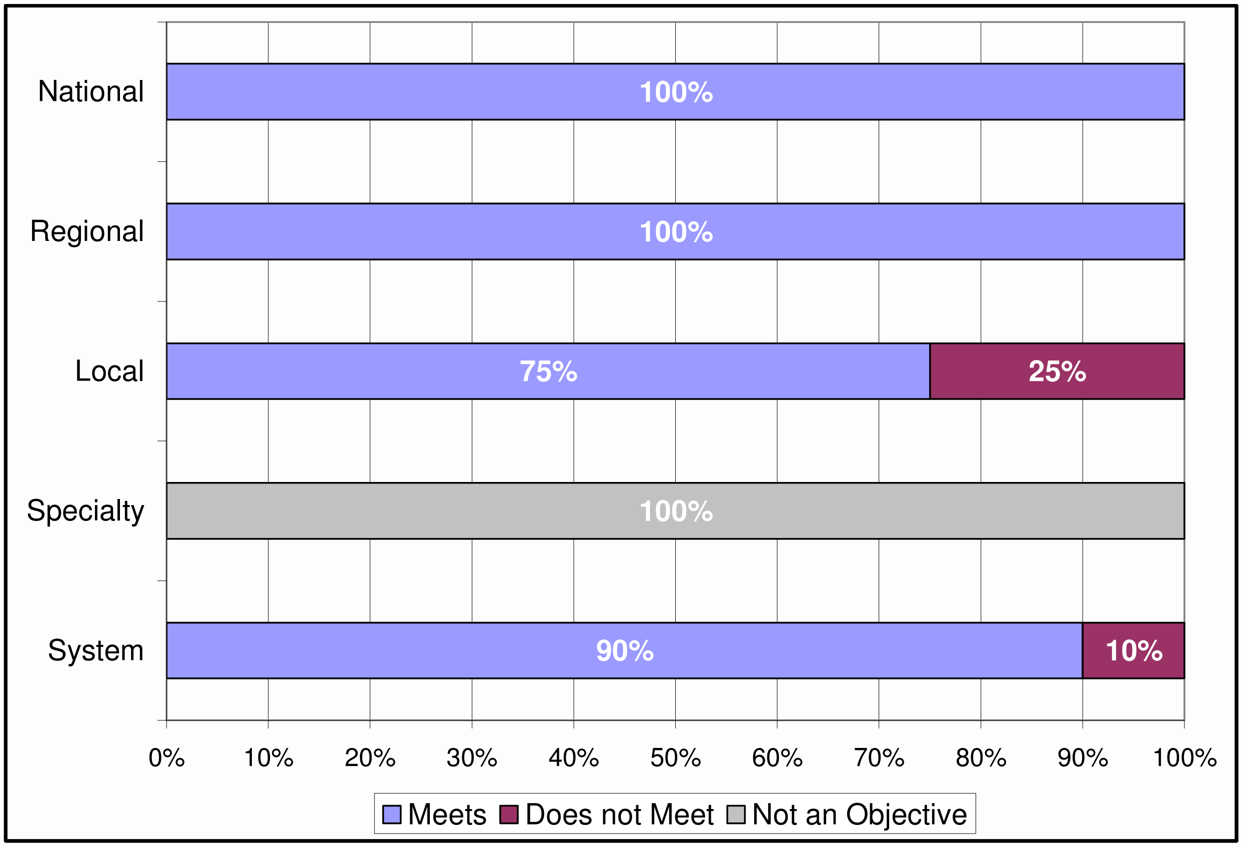
Table D-18
Performance Measure: Development
Airports Meeting Aircraft Maintenance Objectives

Airport Name	Associated City	Meets	Does Not Meet	N/A*
National Service				
Burlington International	Burlington	X		
Edward F. Knapp State	Barre/Montpelier	X		
Rutland State	Rutland	X		
Regional Service				
Hartness State	Springfield	X		
Morrisville-Stowe State	Morrisville	X		
William H. Morse State	Bennington	X		
Local Service				
Caledonia County State	Lyndonville		X	
Franklin County State	Highgate	X		
Middlebury State	Middlebury	X		
Newport State	Newport	X		
Specialty Service				
Basin Harbor	Vergennes			X
Fair Haven Municipal	Fair Haven			X
John H. Boylan State	Island Pond			X
Mount Snow	West Dover			X
Post Mills	Post Mills			X
Shelburne	Shelburne			X
Warren-Sugarbush	Warren			X

Source: Wilbur Smith Associates
*Not Applicable- no specific objective for Specialty Service airports

Providing aircraft maintenance is not recommended for all airports in Vermont, however, as shown on **Exhibit D-18**. Of the airports recommended to provide some level of maintenance service, 90 percent currently meet their objective. All National and Regional Service airports currently provide full service maintenance services (aircraft repair maintenance and/or avionics). Seventy-five percent of Local Service airports provide at least limited maintenance. It should be noted that provision of aircraft maintenance was not an objective for Specialty Service airports.

Exhibit D-18
Performance Measure: Development
Airports Meeting Aircraft Maintenance Objectives



Source: Wilbur Smith Associates

BENCHMARK: PERCENT OF SYSTEM AIRPORTS MEETING MINIMUM FACILITY AND SERVICE OBJECTIVES-AIRPORTS MEETING GROUND TRANSPORTATION OBJECTIVES

When aircraft owners fly into an airport either for business or discretionary purposes, it is often important for them to have access to transportation services. Sometimes, users need or require on-site rental car services, while at other times, off-site rental car services or a loaner car are acceptable. The type of ground transportation recommended for each of the roles is:

- National Service Airports – Rental Car Available
- Regional Service Airports – Rental Car Available
- Local Service Airports – Loaner Car Available, Rental Car Desirable
- Specialty Service Airports – Ground Transportation Desirable

Table D-19 shows which airports meet their ground transportation objectives.

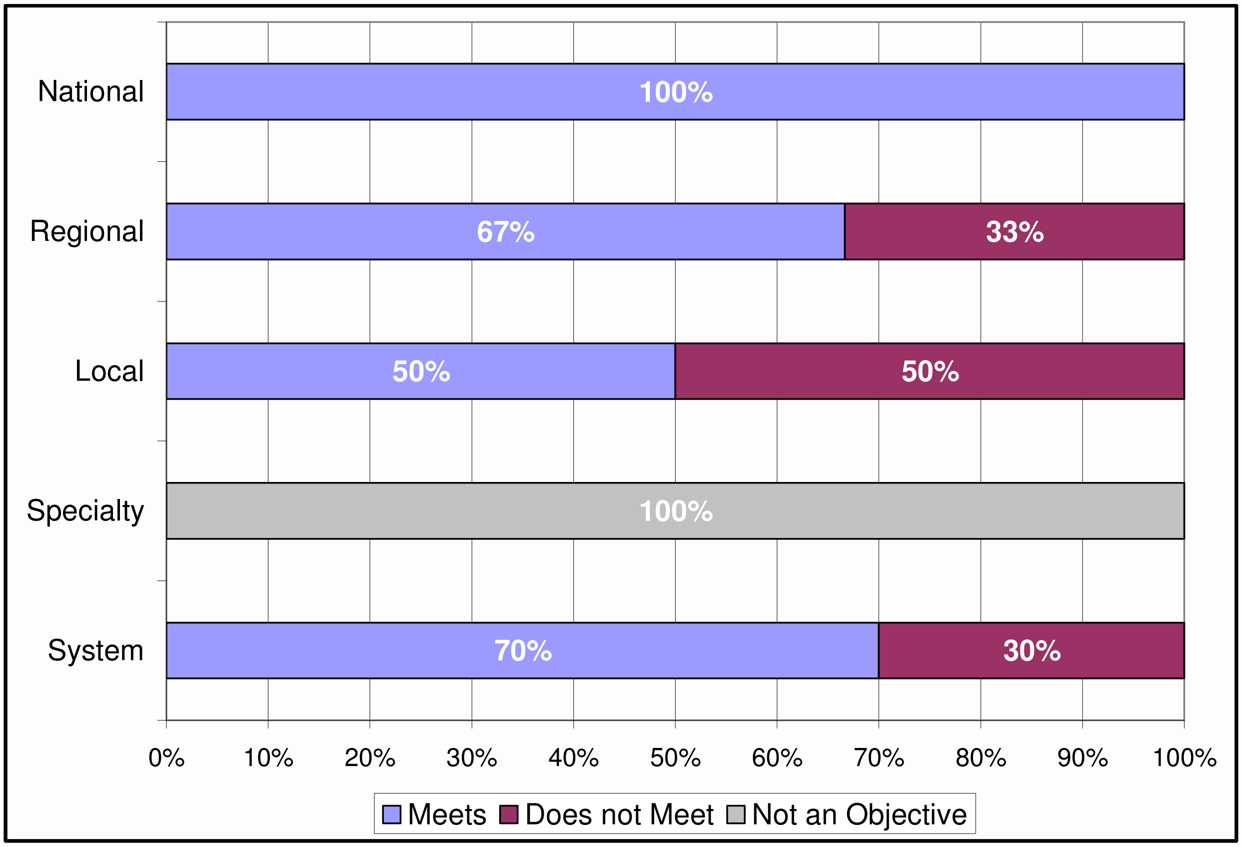
Table D-19
Performance Measure: Development
Airports Meeting Ground Transportation Objectives

Airport Name	Associated City	Meets	Does Not Meet	N/A*
National Service				
Burlington International	Burlington	X		
Edward F Knapp State	Barre/Montpelier	X		
Rutland State	Rutland	X		
Regional Service				
Hartness State	Springfield		X	
Morrisville-Stowe State	Morrisville	X		
William H. Morse State	Bennington	X		
Local Service				
Caledonia County State	Lyndonville		X	
Franklin County State	Highgate	X		
Middlebury State	Middlebury		X	
Newport State	Newport	X		
Specialty Service				
Basin Harbor	Vergennes			X
Fair Haven Municipal	Fair Haven			X
John H Boylan State	Island Pond			X
Mount Snow	West Dover			X
Post Mills	Post Mills			X
Shelburne	Shelburne			X
Warren-Sugarbush	Warren			X

Source: Wilbur Smith Associates
*Not an objective- no specific objective for Specialty Service airports

Exhibit D-19 shows that of the airports that are recommended to provide ground transportation services, system wide, 70 percent of all airports currently meet their objective. One-hundred percent of the airports in the National Service role provide rental car services. Sixty-seven percent of the Regional Service airports meet their ground transportation objective, with Hartness State being the only airport that does not have rental car services available. All of the airports in the Local Service role have a rental car available, but only Franklin County and Newport State provide the recommended loaner car. As a result, only fifty percent of the Local Service airports meet their objective. Ground transportation at Specialty Service airports is only desirable, but not recommended.

Exhibit D-19
Performance Measure: Development
Airports Meeting Ground Transportation Objectives



Source: Wilbur Smith Associates

Appendix E:
Individual Airport Capital Plans

Appendix E includes an individual airport capital plan for each airport, organized alphabetically by airport role (National, Regional, Local and Specialty). The individual capital plans include projects identified through the Airport System and Policy Plan as well as projects identified by the airports through master plans and capital improvement plans. Information presented includes a project description, total estimated cost of the project, estimates of funding eligibility, identification of whether the project was identified through the System Plan or Master Plan, and which facility and/or service objective the project addresses. The following abbreviations were used in the facility and service objective column:

Facility/Service Objective	Code
ARC	ARC
Runway Length	RW-L
Runway Width	RW-W
Runway Strength	RW-S
Taxiway	TAXI
Approach	APP
NAVAIDs	NAV
Lighting	LT
Weather	WEA
Ground Communication	G-C
Covered Storage	STO
Aircraft Apron	APR
GA Terminal	GA-T
Fencing	FEN
Auto Parking	AUTO
Fuel	FUEL
FBO	FBO
Maintenance	MAIN
Ground Transportation	G-T
Planning	PLN
Safety/RSA	SAF

These codes were then used to summarize costs by type for analysis in Chapter Seven.

The individual airport capital plans are presented in the following tables.

Table E-1
Burlington International Airport
Airport System Plan Capital Plan

Burlington International							
Associated City: Burlington							
Ownership: City of Burlington							
Functional Role: National Service							
Project	**Total Cost**	**FAA 95%**	**State 3%**	**Local 2%**	**System Plan**	**Master Plan**	**Facility/Service Objectives**
Cargo Apron	$3,700,000	$3,515,000	$111,000	$74,000		X	
Corporate/Based Aircraft Apron	$3,000,000	$2,850,000	$90,000	$60,000		X	APR
Road/Parking Construction	$900,000	$855,000	$27,000	$18,000	X	X	AUTO
Corporate Jet Center	$5,400,000	$5,130,000	$162,000	$108,000		X	STO
Taxiway G Extension	$9,800,000	$9,310,000	$294,000	$196,000		X	TAXI
Taxiway C Realignment	$4,100,000	$3,895,000	$123,000	$82,000		X	TAXI
Drainage Improvements	$2,900,000	$2,755,000	$87,000	$58,000		X	
Glycol Treatment	$900,000	$855,000	$27,000	$18,000		X	
Terminal Building Improvements	$1,300,000	$1,235,000	$39,000	$26,000		X	
Hangar Expansion	$6,100,000	$0	$0	$6,100,000		X	STO
East Tree Removal	$150,000	$142,500	$4,500	$3,000		X	
West Tree Removal	$190,000	$180,500	$5,700	$3,800		X	
Northwest Tree Removal	$100,000	$95,000	$3,000	$2,000		X	
South Tree Removal	$210,000	$199,500	$6,300	$4,200		X	
West Land Acquisition	$15,000,000	$14,250,000	$450,000	$300,000		X	
Corporate Hangar	$2,800,000	$0	$0	$2,800,000		X	STO
Corporate/GA Apron	$2,400,000	$2,280,000	$72,000	$48,000		X	APR
Corporate/GA Taxiway	$1,500,000	$1,425,000	$45,000	$30,000		X	TAXI
Taxiway Development	$10,000,000	$9,500,000	$300,000	$200,000		X	TAXI
De-icing Hold Pad	$3,200,000	$3,040,000	$96,000	$64,000		X	
Parking Expansion-surface	$829,000	$0	$0	$829,000		X	AUTO
Parking Expansion-employee	$600,000	$570,000	$18,000	$12,000		X	AUTO
Road Realignment	$2,300,000	$2,185,000	$69,000	$46,000		X	
East Land Acquisition	$2,500,000	$2,375,000	$75,000	$50,000		X	
Northwest Land Acquisition	$13,000,000	$12,350,000	$390,000	$260,000		X	
Cargo Building	$2,600,000	$0	$0	$2,600,000		X	
Cargo Apron	$1,500,000	$1,425,000	$45,000	$30,000		X	
Maintenance Hangar	$2,100,000	$0	$0	$2,100,000		X	
T-Hangars and Site Prep	$6,000,000	$5,700,000	$180,000	$120,000		X	
Parking Lot	$787,000	$747,650	$23,610	$15,740		X	
Taxilane to T-Hangars	$2,600,000	$2,470,000	$78,000	$52,000		X	
Hold Apron	$3,500,000	$3,325,000	$105,000	$70,000		X	
Terminal Expansion	$1,000,000	$950,000	$30,000	$20,000		X	
South Land Acquisition	$6,500,000	$6,175,000	$195,000	$130,000		X	
Airport Layout Plan Update (2014 & 2024)	$800,000	$760,000	$24,000	$16,000	X		PLN
Total	**$120,266,000**	**$100,545,150**	**$3,175,110**	**$16,545,740**			
Total System Plan Costs (minus any CIP)	$1,700,000	$1,615,000	$51,000	$34,000			
Total CIP Costs	$118,566,000	$98,930,150	$3,124,110	$16,511,740			

Source: VTrans, Airport personnel, Wilbur Smith Associates

Table E-2
Edward F. Knapp State Airport
Airport System Plan Capital Plan

Edward F. Knapp State							
Associated City: Barre/Montpelier							
Ownership: VTrans							
Functional Role: National Service							
Project	**Total Cost**	**FAA 95%**	**State 5%**	**Local 0%**	**System Plan**	**Master Plan**	**Facility/Service Objectives**
Extend RWY 35 by 498'	$373,500	$354,825	$18,675	$0	X		RW-L
Extend Taxiway to a Full Parallel on RWY 17-35	$1,200,000	$1,140,000	$60,000	$0	X	X	TAXI
Env. Assessment/Env. Impact Statement	$150,000	$142,500	$7,500	$0	X		PLN
Install Lighted Wind Cone	$10,000	$9,500	$500	$0	X		NAV
Upgrade RWY Lighting to HIRL	$275,000	$261,250	$13,750	$0	X		LT
Install MITL	$800,000	$760,000	$40,000	$0	X	X	LT
Construct 29,835 Sq. Ft. of Covered Storage	$1,640,925	$1,558,879	$82,046	$0	X		STO
Extend Fencing Around Entire Airport	$300,000	$285,000	$15,000	$0	X		FEN
Addition of 51 Auto Parking Spaces	$51,000	$48,450	$2,550	$0	X		AUTO
Airport Layout Plan Update (2010 & 2020)	$240,000	$228,000	$12,000	$0	X		PLN
Civil Air Patrol Wing Headquarters	$50,000	$0	$50,000	$0		X	
Parallel TW 17/35 & RW 5/23 Reconstruct & Apron Design	$285,000	$270,750	$14,250	$0		X	TAXI, APR
Terminal Area Apron	$800,000	$760,000	$40,000	$0		X	APR
Runway 5/23 Reconstruct	$1,300,000	$1,235,000	$65,000	$0		X	RW-S
Total	**$7,475,425**	**$7,054,154**	**$421,271**	**$0**			
Total System Plan Costs (minus any CIP)	$3,040,425	$2,888,404	$152,021	$0			
Total CIP Costs	$4,435,000	$4,165,750	$269,250	$0			

Source: VTrans, Airport personnel, Wilbur Smith Associates

Table E-3
Rutland State Airport
Airport System Plan Capital Plan

Rutland State							
Associated City: Rutland							
Ownership: VTrans							
Functional Role: National Service							
Project	**Total Cost**	**FAA 95%**	**State 5%**	**Local 0%**	**System Plan**	**Master Plan**	**Facility/Service Objectives**
Extend RWY 19 by 500'	$5,000,000	$4,750,000	$250,000	$0	X		RW-L
Construct Full Parallel Taxiway on RWY 1-19	$1,443,750	$1,371,563	$72,188	$0	X		TAXI
Env. Assessment/Env. Impact Statement	$150,000	$142,500	$7,500	$0	X		PLN
Install Precision GPS	$500,000	$475,000	$25,000	$0	X		APP, NAV
Upgrade RWY Lighting to HIRL	$275,000	$261,250	$13,750	$0	X		LT
Addition of 31 Auto Parking Spaces	$31,000	$29,450	$1,550	$0	X		AUTO
Airport Layout Plan Update (2016)	$120,000	$114,000	$6,000	$0	X		PLN
RSA Improvements	$3,000,000	$2,850,000	$150,000	$0		X	SAF
ALP/RSA/RW Extension Alternatives	$150,000	$142,500	$7,500	$0		X	RW-L
Total	**$10,669,750**	**$10,136,263**	**$533,488**	**$0**			
Total System Plan Costs (minus any CIP)	$7,519,750	$7,143,763	$375,988	$0			
Total CIP Costs	$3,150,000	$2,992,500	$157,500	$0			

Source: VTrans, Airport personnel, Wilbur Smith Associates

Table E-4
William H. Morse State Airport
Airport System Plan Capital Plan

William H. Morse State							
Associated City: Bennington							
Ownership: VTrans							
Functional Role: Recommended for National Service							
Project	**Total Cost**	**FAA 95%**	**State 5%**	**Local 0%**	**System Plan**	**Master Plan**	**Facility/Service Objectives**
796' extension on RWY 13	$447,750	$425,363	$22,388	$0	X		RW-L
25' widening on RWY 13	$1,031,250	$979,688	$51,563	$0	X		RW-W
Runway Reconstruction	$2,200,000	$2,090,000	$110,000	$0	X	X	RW-S
Construct Full Parallel Taxiway on RWY 13-31	$1,312,500	$1,246,875	$65,625	$0	X		TAXI
Env. Assessment/Env. Impact Statement	$150,000	$142,500	$7,500	$0	X		PLN
Install Precision GPS, MALSR	$2,000,000	$1,900,000	$100,000	$0	X		APP, NAV
Upgrade RWY Lighting to HIRL	$275,000	$261,250	$13,750	$0	X		LT
Construct 500 Sq. Ft. of Covered Storage	$27,500	$26,125	$1,375	$0	X		STO
500 Sq. Ft. Terminal Addition	$62,500	$59,375	$3,125	$0	X		GA-T
Extend Fencing Around Entire Airport	$200,000	$190,000	$10,000	$0	X		FEN
Addition of 34 Auto Parking Spaces	$34,000	$32,300	$1,700	$0	X		AUTO
Extend RWY 13 by 1,000' (total length 5,500')	$1,000,000	$950,000	$50,000	$0	X		RW-L
Install additional HIRL on RWY 13	$50,000	$47,500	$2,500	$0	X		LT
Airport Layout Plan Update (2015 & 2025)	$240,000	$228,000	$12,000	$0	X		PLN
Total	**$9,030,500**	**$8,578,975**	**$451,525**	**$0**			
Total System Plan Costs (minus any CIP)	$6,830,500	$6,488,975	$341,525	$0			
Total CIP Costs	$2,200,000	$2,090,000	$110,000	$0			

Source: VTrans, Airport personnel, Wilbur Smith Associates

Table E-5
Hartness State Airport
Airport System Plan Capital Plan

Hartness State							
Associated City: Springfield							
Ownership: VTrans							
Functional Role: Regional Service							
Project	**Total Cost**	**FAA 95%**	**State 5%**	**Local 0%**	**System Plan**	**Master Plan**	**Facility/Service Objectives**
Construct Full Parallel Taxiway on RWY 5-23	$1,500,000	$1,425,000	$75,000	$0	X		TAXI
Env. Assessment/Env. Impact Statement	$150,000	$142,500	$7,500	$0	X		PLN
Install Lighted Wind Cone	$10,000	$9,500	$500	$0	X		NAV
Install GCO or RCO	$15,000	$14,250	$750	$0	X		G-C
Construct 14,800 Sq. Ft. of Covered Storage	$814,000	$773,300	$40,700	$0	X		STO
500 Sq. Ft. Terminal Addition	$62,500	$59,375	$3,125	$0	X		GA-T
Extend Fencing Around Entire Airport	$200,000	$190,000	$10,000	$0	X		FEN
Self Serve Fuel Capabilities (JetA)	$90,000	$85,500	$4,500	$0	X		FUEL
Airport Layout Plan Update (2013 & 2023)	$240,000	$228,000	$12,000	$0	X		PLN
Obstr. Removal & Hazard Beacon	$200,000	$190,000	$10,000	$0		X	APP, NAV
Total	**$3,281,500**	**$3,117,425**	**$164,075**	**$0**			
Total System Plan Costs (minus any CIP)	$3,081,500	$2,927,425	$154,075	$0			
Total CIP Costs	$200,000	$190,000	$10,000	$0			

Source: VTrans, Airport personnel, Wilbur Smith Associates

Table E-6
Morrisville-Stowe Airport
Airport System Plan Capital Plan

Morrisville-Stowe State							
Associated City: Morrisville							
Ownership: VTrans							
Functional Role: Regional Service							
Project	**Total Cost**	**FAA 95%**	**State 5%**	**Local 0%**	**System Plan**	**Master Plan**	**Facility/Service Objectives**
Extend Runway 1,299'	$691,313	$656,747	$34,566	$0	X		RW-L
Strengthen RWY by 5,000 lbs.; RWY Overlay/Reconstruction	$2,500,000	$2,375,000	$125,000	$0	X	X	RW-S
Construct Full Parallel Taxiway on RWY 1-19	$1,312,500	$1,246,875	$65,625	$0	X		TAXI
Env. Assessment/Env. Impact Statement	$150,000	$142,500	$7,500	$0	X		PLN
Construct 8,600 Sq. Ft. of Covered Storage	$473,000	$449,350	$23,650	$0	X		STO
1,200 Sq. Ft. Terminal Addition	$150,000	$142,500	$7,500	$0	X		GA-T
Extend Fencing Around Entire Airport	$200,000	$190,000	$10,000	$0	X		FEN
Airport Layout Plan Update (2015 & 2025)	$240,000	$228,000	$12,000	$0	X		PLN
Obstruction removal (approach)	$430,000	$408,500	$21,500	$0		X	APP
Easement Acquisition	$150,000	$142,500	$7,500	$0		X	
Total	**$6,296,813**	**$5,981,972**	**$314,841**	**$0**			
Total System Plan Costs (minus any CIP)	$3,216,813	$3,055,972	$160,841	$0			
Total CIP Costs	$3,080,000	$2,926,000	$154,000	$0			

Source: VTrans, Airport personnel, Wilbur Smith Associates

Table E-7
Caledonia State Airport
Airport System Plan Capital Plan

Caledonia State							
Associated City: Lyndonville							
Ownership: Vtrans							
Functional Role: Local Service							
Project	**Total Cost**	**FAA 95%**	**State 5%**	**Local 0%**	**System Plan**	**Master Plan**	**Facility/Service Objectives**
Extend RWY 2 by 700'	$315,000	$299,250	$15,750	$0	X		RW-L
Increase RWY Width by 15'	$450,000	$427,500	$22,500	$0	X		RW-W
Env. Assessment/Env. Impact Statement	$150,000	$142,500	$7,500	$0	X		PLN
Install Rotating Beacon	$50,000	$47,500	$2,500	$0	X	X	NAV
Install Lighted Wind Cone	$10,000	$9,500	$500	$0	X		NAV
Upgrade Lighting to MIRL	$250,000	$237,500	$12,500	$0	X	X	LT
Construct 10,700 Sq. Ft. of Covered Storage	$400,000	$0	$200,000	$0	X	X	STO
Fencing Around Operations Area	$100,000	$95,000	$5,000	$0	X		FEN
Addition of 14 Auto Parking Spaces	$14,000	$13,300	$700	$0	X		AUTO
Airport Layout Plan Update (2010 & 2020)	$240,000	$228,000	$12,000	$0	X		PLN
Hazard beacons/obstr lights	$200,000	$190,000	$10,000	$0		X	NAV
Partial Parallel Taxiway	$1,000,000	$950,000	$50,000	$0		X	TAXI
Runway Reconstruction	$2,000,000	$1,900,000	$100,000	$0		X	RW-S
Total	**$5,179,000**	**$4,540,050**	**$438,950**	**$0**			
Total System Plan Costs (minus any CIP)	$1,279,000	$1,215,050	$63,950	$0			
Total CIP Costs	$3,900,000	$3,325,000	$375,000	$0			

Source: VTrans, Airport personnel, Wilbur Smith Associates

Table E-8
Franklin County State Airport
Airport System Plan Capital Plan

Franklin County State							
Associated City: Highgate							
Ownership: VTrans							
Functional Role: Local Service							
Project	Total Cost	FAA 95%	State 5%	Local 0%	System Plan	Master Plan	Facility/Service Objectives
Extend RWY 19 by 1,000’	$1,000,000	$950,000	$50,000	$0	X		RW-L
Increase Width by 15’	$450,000	$427,500	$22,500	$0	X		RW-W
Env. Assessment/Env. Impact Statement	$150,000	$142,500	$7,500	$0	X		PLN
Construct 10,800 Sq. Ft. of Covered Storage/T-Hangars	$650,000	$617,500	$32,500	$0	X	X	STO
Fencing Around Operations Area	$100,000	$95,000	$5,000	$0	X		FEN
Addition of 28 Auto Parking Spaces	$28,000	$26,600	$1,400	$0	X		AUTO
Airport Layout Plan Update (2015 & 2025)	$240,000	$228,000	$12,000	$0	X		PLN
Rwy 1-19 RSA	$500,000	$475,000	$25,000	$0		X	SAF
Total	**$3,118,000**	**$2,962,100**	**$155,900**	**$0**			
Total System Plan Costs (minus any CIP)	$1,968,000	$1,869,600	$98,400	$0			
Total CIP Costs	$1,150,000	$1,092,500	$57,500	$0			

Source: VTrans, Airport personnel, Wilbur Smith Associates

Table E-9
Middlebury Airport
Airport System Plan Capital Plan

Middlebury State							
Associated City: Middlebury							
Ownership: VTrans							
Functional Role: Local Service							
Project	Total Cost	FAA 95%	State 5%	Local 0%	System Plan	Master Plan	Facility/Service Objectives
Extend RWY 1 by 1,500’	$1,130,000	$1,073,500	$56,500	$0	X		RW-L
Increase RWY Width by 25’	$750,000	$712,500	$37,500	$0	X		RW-W
Env. Assessment/Env. Impact Statement	$150,000	$142,500	$7,500	$0	X		PLN
Install VGSIs	$30,000	$28,500	$1,500	$0	X		APP
Rotating Beacon	$50,000	$47,500	$2,500	$0	X		NAV
Lighted Windcone	$10,000	$9,500	$500	$0	X		NAV
Install MIRL	$200,000	$190,000	$10,000	$0	X		LT
Install ASOS or AWOS	$130,000	$123,500	$6,500	$0	X		WEA
Construct 49,700 Sq. Ft. of Covered Storage/T-Hangar	$400,000	$380,000	$20,000	$0	X	X	STO
Fencing Around Operations Area	$100,000	$95,000	$5,000	$0	X		FEN
Addition of 1 Auto Parking Space	$1,000	$950	$50	$0	X		AUTO
Airport Layout Plan Update (2013 & 2023)	$240,000	$228,000	$12,000	$0	X		PLN
Safety Area	$450,000	$427,500	$22,500	$0	X	X	SAF
Total	**$3,641,000**	**$3,458,950**	**$182,050**	**$0**			
Total System Plan Costs (minus any CIP)	$2,791,000	$2,651,450	$139,550	$0			
Total CIP Costs	$850,000	$807,500	$42,500	$0			

Source: VTrans, Airport personnel, Wilbur Smith Associates

Table E-10
Newport State Airport
Airport System Plan Capital Plan

Newport State							
Associated City: Newport							
Ownership: VTrans							
Functional Role: Local Service							
Project	**Total Cost**	**FAA**	**State**	**Local**	**System Plan**	**Master Plan**	**Facility/Service Objectives**
		95%	**5%**	**0%**			
Construct 3,000 Sq. Ft. of Covered Storage	$300,000	$0	$300,000	$0	X	X	STO
Fencing Around Operations Area	$100,000	$95,000	$5,000	$0	X		FEN
Airport Layout Plan Update (2013 & 2023)	$240,000	$228,000	$12,000	$0	X		PLN
Reconstruct Rwy 5-23	$2,200,000	$2,090,000	$110,000	$0		X	RW-S
Total	**$2,840,000**	**$2,413,000**	**$427,000**	**$0**			
Total System Plan Costs (minus any CIP)	$340,000	$323,000	$317,000	$0			
Total CIP Costs	$2,500,000	$2,090,000	$110,000	$0			

Source: VTrans, Airport personnel, Wilbur Smith Associates

Table E-11
Basin Harbor Airport
Airport System Plan Capital Plan

Basin Harbor							
Associated City: Vergennes							
Ownership: Private							
Functional Role: Specialty Service							
Project	**Total Cost**	**FAA**	**State**	**Local**	**System Plan**	**Master Plan**	**Facility/Service Objectives**
		0%	**0%**	**100%**			
Install PWBS	$5,000	$0	$0	$5,000	X		WEA
AvGas Tanks and Pumps	$60,000	$0	$0	$60,000	X		FUEL
Install Public Phone ***	$1,000	$0	$0	$1,000	X		G-C
Fencing Around Operations Area	$25,000	$0	$0	$25,000	X		FEN
Airport Layout Plan as Needed	$25,000	$0	$0	$25,000	X		PLN
Total	**$116,000**	**$0**	**$0**	**$116,000**			
Total System Plan Costs (minus any CIP)	$116,000	$0	$0	$116,000			
Total CIP Costs	$0	$0	$0	$0			

***A public phone is available at the Red Mill Restaurant adjacent to the airport, but not directly on the field.

Source: VTrans, Airport personnel, Wilbur Smith Associates

Table E-12
Fair Haven Municipal Airport
Airport System Plan Capital Plan

Fair Haven Municipal							
Associated City: Fair Haven							
Ownership: Town of Fair Haven							
Functional Role: Specialty Service							
Project	**Total Cost**	**FAA 95%**	**State 3.0%**	**Local 2.0%**	**System Plan**	**Master Plan**	**Facility/Service Objectives**
Install PWBS	$5,000	$4,750	$150	$100	X		WEA
Install Public Phone	$1,000	$950	$30	$20	X		G-C
AvGas Tanks and Pumps	$60,000	$57,000	$1,800	$1,200	X		FUEL
Fencing Around Operations Area	$25,000	$23,750	$750	$500	X		FEN
Airport Layout Plan Update (2014 & 2024)	$240,000	$228,000	$7,200	$4,800	X		PLN
Runway Design/permitting	$300,000	$285,000	$9,000	$6,000		X	RW-L-W-S
New 2650' Paved Runway	$3,000,000	$2,850,000	$90,000	$60,000	X	X	RW-L-W-S
Total	**$3,631,000**	**$3,449,450**	**$108,930**	**$72,620**			
Total System Plan Costs (minus any CIP)	$331,000	$314,450	$9,930	$6,620			
Total CIP Costs	$3,300,000	$3,135,000	$99,000	$66,000			

Source: VTrans, Airport personnel, Wilbur Smith Associates

Table E-13
John H. Boylan State Airport
Airport System Plan Capital Plan

John H. Boylan State							
Associated City: Island Pond							
Ownership: VTrans							
Functional Role: Specialty Service							
Project	**Total Cost**	**FAA 0%**	**State 100%**	**Local 0%**	**System Plan**	**Master Plan**	**Facility/Service Objectives**
Install PWBS	$5,000	$0	$5,000	$0	X		WEA
Install Public Phone	$1,000	$0	$1,000	$0	X		G-C
AvGas Tanks and Pumps	$60,000	$0	$60,000	$0	X		FUEL
Fencing Around Operations Area	$37,500	$0	$37,500	$0	X		FEN
Airport Layout Plan Update (2013 & 2023)	$75,000	$0	$75,000	$0	X		PLN
Runway Safety Area Improvements	$400,000	$0	$50,000	$0		X	SAF
Total	**$578,500**	**$0**	**$228,500**	**$0**			
Total System Plan Costs (minus any CIP)	$178,500	$0	$178,500	$0			
Total CIP Costs	$400,000	$0	$50,000	$0			

Source: VTrans, Airport personnel, Wilbur Smith Associates

Table E-14
Mount Snow Airport
Airport System Plan Capital Plan

Mount Snow							
Associated City: West Dover							
Ownership: Private							
Functional Role: Specialty Service							
Project	**Total Cost**	**FAA**	**State**	**Local**	**System Plan**	**Master Plan**	**Facility/Service Objectives**
		0%	**0%**	**100%**			
Construct Turnarounds on RWY 1-19	$150,000	$0	$0	$150,000	X		TAXI
Install PWBS	$5,000	$0	$0	$5,000	X		WEA
Install Public Phone	$1,000	$0	$0	$1,000	X		G-C
Runway Overlay or Rehab	$1,590,000	$0	$0	$1,590,000	X		RW-S
Fencing Around Operations Area	$25,000	$0	$0	$25,000	X		FEN
Airport Layout Plan as Needed	$25,000	$0	$0	$25,000	X		PLN
Total	**$1,796,000**	**$0**	**$0**	**$1,796,000**			
Total System Plan Costs (minus any CIP)	$1,796,000	$0	$0	$1,796,000			
Total CIP Costs	$0	$0	$0	$0			

Source: VTrans, Airport personnel, Wilbur Smith Associates

Table E-15
Post Mills Airport
Airport System Plan Capital Plan

Post Mills							
Associated City: Post Mills							
Ownership: Private							
Functional Role: Speciality Service							
Project	**Total Cost**	**FAA**	**State**	**Local**	**System Plan**	**Master Plan**	**Facility/Service Objectives**
		0%	**0%**	**100%**			
Install PWBS	$5,000	$0	$0	$5,000	X		WEA
Install Public Phone	$1,000	$0	$0	$1,000	X		G-C
AvGas Tanks and Pumps	$60,000	$0	$0	$60,000	X		FUEL
Fencing Around Operations Area	$25,000	$0	$0	$25,000	X		FEN
Airport Layout Plan as Needed	$25,000	$0	$0	$25,000	X		PLN
Total	**$116,000**	**$0**	**$0**	**$116,000**			
Total System Plan Costs (minus any CIP)	$116,000	$0	$0	$116,000			
Total CIP Costs	$0	$0	$0	$0			

Source: VTrans, Airport personnel, Wilbur Smith Associates

Table E-16
Shelburne Airport
Airport System Plan Capital Plan

Shelburne							
Associated City: Shelburne							
Ownership: Private							
Functional Role: Specialty Service							
Project	**Total Cost**	**FAA**	**State**	**Local**	**System Plan**	**Master Plan**	**Facility/Service Objectives**
		0%	**0%**	**100%**			
Install PWBS	$5,000	$0	$0	$5,000	X		WEA
Fencing Around Operations Area	$25,000	$0	$0	$25,000	X		FEN
AvGas Tanks and Pumps	$60,000	$0	$0	$60,000	X		FUEL
Airport Layout Plan as Needed	$25,000	$0	$0	$25,000	X		PLN
Total	**$115,000**	**$0**	**$0**	**$115,000**			
Total System Plan Costs (minus any CIP)	$115,000	$0	$0	$115,000			
Total CIP Costs	$0	$0	$0	$0			

Source: VTrans, Airport personnel, Wilbur Smith Associates

Table E-17
Warren-Sugarbush Airport
Airport System Plan Capital Plan

Warren-Sugarbush							
Associated City: Warren							
Ownership: Private							
Functional Role: Specialty Service							
Project	**Total Cost**	**FAA**	**State**	**Local**	**System Plan**	**Master Plan**	**Facility/Service Objectives**
		0%	**0%**	**100%**			
Increase RWY Width by 30’	$579,375	$0	$0	$579,375	X		RW-W
Install PWBS	$5,000	$0	$0	$5,000	X		WEA
Fencing Around Operations Area	$25,000	$0	$0	$25,000	X		FEN
Airport Layout Plan as Needed	$25,000	$0	$0	$25,000	X		PLN
Total	**$634,375**	**$0**	**$0**	**$634,375**			
Total System Plan Costs (minus any CIP)	$634,375	$0	$0	$634,375			
Total CIP Costs	$0	$0	$0	$0			

Source: VTrans, Airport personnel, Wilbur Smith Associates

Appendix F: Glossary of Terms

Above Ground Level (AGL) - Altitude expressed as feet above terrain or airport elevation *(see MSL).*

Advisory Circular (AC) - Federal Aviation Administration Advisory Circular. This is a FAA document, which provides guidance on aviation issues.

Ailerons - An aircraft control surface hinged to the rear, outer section of the wing for banking ("tilting") the aircraft. A bank causes an aircraft to turn. Controlled by right or left movement of the control yoke or stick.

Air Carriers - This includes the commercial system of air transportation and consists of certified route air carriers, air taxis (including commuters) supplemental air carriers, commercial operators of large aircraft, and air travel clubs. Air Carriers are certified under FAA regulations to carry passengers under FAR Part 121, 127, 135, etc.

Aircraft Approach Category - A grouping of aircraft based on 1.3 times their stall speed in the landing configuration at the certificated maximum flap setting and maximum landing weight at standard atmospheric conditions. The categories are as follows:

- Category A: Speed less than 91 knots.
- Category B: Speed 91 knots or more but less than 121 knots.
- Category C: Speed 121 knots or more but less than 141 knots.
- Category D: Speed 141 knots or more but less than 166 knots.
- Category E: Speed 166 knots or more.

Airfield Capacity - Airfield capacity is the maximum number of aircraft operations that can be accommodated by an airport's runways and taxiways over a specified time period (e.g. hourly capacity).

Airline Transport Pilot (ATP) - The most advanced of all pilot certificates, requiring the highest skill and experience levels. Required: a minimum of 1,500 hours flight experience, ATP written exam and flight test. Mandatory for captains of *Part 121* major scheduled airlines, regional carriers, *Part 125* scheduled commuter airlines, and some *Part 135* operations. A hiring requirement for many pilot positions in corporate and commercial general aviation flying.

Airplane Design Group (ADG) - A grouping of airplanes based on wingspan. The groups are as follows:

- Group I: Up to but not including 49 feet (15 m).
- Group II: 49 feet (15 m) up to but not including 79 feet (24 m).
- Group III: 79 feet (24 m) up to but not including 118 feet (36 m).
- Group IV: 118 feet (36 m) up to but not including 171 feet (52 m).
- Group V: 171 feet (52 m) up to but not including 214 feet (65 m).
- Group VI: 214 feet (65 m) up to but not including 262 feet (80 m).

Airport Elevation - The highest point on an airport's usable runway expressed in feet above mean sea level (MSL).

Airport Layout Plan (ALP) - The plan of an airport showing the layout of existing and proposed airport facilities.

Airport Reference Point (ARP) - The latitude and longitude of the approximate center of the airport.

Airport Slots – The number of landings or takeoffs allowed for a specified time period. Slots are sometimes used at commercial airports when the hourly demand significantly exceeds hourly capacity. In the United States, the only airports with slot restrictions are Kennedy and LaGuardia in New York, National in Washington, DC, and O'Hare in Chicago.

Airport Traffic Control Tower (ATCT) - A facility providing airport traffic control service to an airport and its associated airspace area.

Air Taxi - A FAR Part 135 certificated air carrier carrying passengers and cargo for hire and operating under exemption authority from the Civil Aeronautics Board; aircraft of 30 seats or less or maximum payloads of 7,500 lbs.

Air Traffic Control (ATC) - The FAA service providing separation services to participating airborne traffic and clearances to land, take off or taxi at airports with a control tower.

Altimeter - A highly sensitive barometer that shows an aircraft's altitude above *mean sea level* by measuring atmospheric pressure.

Altimeter Setting - A value related to local barometric pressure, usually provided to pilots *by ATC.* Used as a reference setting so that the aircraft *altimeter* indicates an accurate altitude. Above 18,000 feet, all pilots use a standard setting of 29.92 inches of mercury.

Annual Service Volume (ASV) - ASV is a reasonable estimate of an airport's annual capacity. It accounts for differences in runway use, aircraft mix, weather conditions, etc., that would be encountered over a year's time.

Approach (Departure) Control - Radar-based *air traffic control*, associated with the control tower at larger airports. Provides traffic separation services from outside the immediate airport area to a distance of about 40 miles.

Approach End of Runway - The approach end of runway is the near end of the runway as viewed from the cockpit of a landing airplane.

ARSA - *(See CLASS C Airspace)*

ATA - *(See CLASS D Airspace)*

Automated Flight Service Station (AFSS) - A (non-air traffic control) *FAA* facility providing pilots with weather briefing and flight-plan filing by radio, telephone and in person. Monitors flight plans for overdue aircraft and initiates search and rescue services. "Automated" refers to telephone call handling equipment and computer information systems aiding pilot briefers.

Automated Surface Observation System (ASOS) - The primary surface weather observing system in the U.S., supporting aviation operations and weather forecasting. Automated sensors record wind direction and speed, visibility, cloud ceiling, precipitation, etc. Data sent automatically to the National Weather Service. At many locations, a computer-generated voice broadcasts the minute-by-minute weather reports to pilots on a discrete radio frequency.

Automated Terminal Information System (ATIS) - A continuous broadcast on a separate *ATC* frequency of an airport's current weather (updated at least hourly). Eliminates controller requirement to read local weather data to each landing or departing aircraft.

Automated Weather Observing System (AWOS) - Provides automated airport weather observations to pilots on a discrete radio frequency via a computer-generated voice. Less sophisticated than *ASOS,* usually installed using state funds.

Auxiliary Flight Service Station (XFSS) - A local-service FSS facility retained where special operational or weather conditions mandated an exception from consolidation. Provides only airport advisories and weather observations. Twenty of the 46 XFSSs are in Alaska.

Available Ton Miles (ATMs) - Tons multiplied by miles flown. It is an international measure of the capacity available for a carrier. It is also used to measure capacity available for freight carriers.

Available Seat Miles (ASM) - The number of seats available multiplied by the number of miles flown. This measures an airline's capacity capability. For example, a transport configured to fly 100 seats that goes 100 miles would give the carrier 10,000 ASMs for that particular flight.

Available Seat Kilometers (ASK) - The number of seats flown multiplied by the number of kilometers they are flown.

Available Ton Kilometers (ATK) - The number of tons capable of being carried, multiplied by the number of kilometers flown.

Average Fare - Passenger revenue divided by the number of passengers.

Base or Base Leg - The leg perpendicular to *the final* leg of the *traffic pattern* to the landing runway.

Based Aircraft - An aircraft permanently stationed at an airport by agreement between the airport owner (management or FBO) and the aircraft owner.

Bilateral Aviation Agreement - An agreement between two countries similar to a treaty, but concerning only aviation rights.

Blast Fence - A barrier used to divert or dissipate jet blast or propeller wash.

Block Hours - The time between when an aircraft departs the gate and its arrival at its destination gate.

Breakeven Load Factor (BELF) - The load factor necessary for the carrier to financially break even. It is a function of the percentage of seats filled at a particular yield vs. the airline's operating costs.

Building Restriction Line (BRL) - A line that identifies suitable building area locations on airports.

Capacity - The maximum number of aircraft operations that can be accommodated by an airport (or airport component) over a specified time period (e.g. hourly capacity). When the demand exceeds capacity, the level of delay rapidly increases.

Capital Costs - Non-recurring or infrequently recurring costs of long-term assets, such as land, guideways, stations, buildings, and vehicles.

Center - One of 24 FAA Air Route Traffic Control Centers providing radar surveillance and traffic separation to participating en route traffic above and outside airspace handled by *Approach and Departure Control.*

Certificated Flight Instructor (CFI) - A pilot holding a Commercial pilot certificate who, after passing two written tests and a practical flight exam, is FAA-rated to give flight instruction. The flight instructor rating is specific as to type of instruction authorized, e.g., single-engine airplane, multi-engine airplane, instrument flying (CFII), helicopter; etc.

Class A Airspace - Airspace between 18,000 and 60,000 feet *MSL* over the conterminous United States. *IFR* clearances are required for all aircraft operating in CLASS A airspace. Formerly called the Positive Control Area.

Class B Airspace - Airspace area around the busiest U.S. hub airports, typically to a radius of 20 *nautical miles* and up to 10,000 feet above ground level. Operations within CLASS B airspace require an ATC clearance and at least a Private pilot certificate (local waivers available), radio communication, and an altitude-reporting (Mode C) *transponder.* Formerly called TCA.

Class C Airspace - Airspace area around busy U.S. airports (other than CLASS B). Radio contact with approach control is mandatory for all traffic. Typically includes an area from the surface to 1,200 feet *AGL* out to 5 miles and from 1,200 to 4,000 feet AGL to 10 miles from the airport. Formerly called Airport Radar Service Area (ARSA).

Class D Airspace - Airspace around an airport with an operating control tower; typically to a radius of 5 miles from the surface to 2,500 feet AGL. Radio contact with the control tower required prior to entry. Formerly called Airport Traffic Area (ATA).

Class E Airspace - General *controlled airspace* comprising control areas, transition areas, Victor airways, the Continental Control Area, etc.

Class F Airspace - International airspace designation not used in the U.S.

Class G Airspace - Uncontrolled airspace, generally the airspace from the surface up to 700 or 1,200 feet AGL in most of the U.S., but up to as high as 14,500 feet in some remote Western and sparsely populated areas.

Clear Zone - See Runway Protection Zone.

Clearance - Formal instructions from air traffic control authorizing a specific route or action (climb or descend, entry into *controlled airspace).* Pilots may deviate from an ATC clearance in an emergency or when compliance would threaten safety of flight.

Clearway (CWY) - A defined rectangular area beyond the end of a runway cleared or suitable for use in lieu of runway to satisfy takeoff distance requirements.

Code-Sharing - A growing practice in which airlines share the same two-letter designator code on certain flights, as they are presented in the various computer reservations systems used by airlines and travel agents. Sharing of the codes permits a travel agent or airline to sell a ticket that will include routings of both carriers where codes are shared.

Commercial Pilot - Holder of an FAA Commercial pilot certificate, requiring a minimum of 250 flight hours (and other sub-requirements), a Commercial written test and Commercial flight test. The pilot certificate to fly for compensation or hire, often in a wide variety of commercial general aviation operations including sightseeing, aerial application, glider towing and flight instruction. It does not necessarily imply flying for a scheduled airline. (See *ATP*. FYI: More than 40% of general aviation pilots are licensed as Commercial or ATP pilots, whether they fly for a living or not.)

Commercial Service Airport - A public airport, which enplanes 2,500 or more passengers annually and receives scheduled commercial passenger service. See "AIR CARRIER" for more information.

Common Traffic Advisory Frequency (CTAF) - The radio frequency, also called the *UNICOM* frequency, used by all traffic at an airport without an operating control tower to coordinate approaches and landings, takeoffs and departures. Pilots announce their positions, intentions and actions in the *traffic pattern* for the benefit of other traffic.

Commuter Airlines - Scheduled commuter air carrier operating with passengers, cargo, or mail for revenue in accordance with FAR Part 135 or Part 121.

Compass Calibration Pad - An airport facility used for calibrating an aircraft compass.

Computer Reservations Systems - The electronic system that allows travel agents or airlines to reserve seats on commercial flights.

Congestion - The volume of traffic at which a road, airport, or other transportation facility is no longer operating at an acceptable level of service.

Controlled Airspace - A generic term including all airspace classes in which *ATC* services are available. Does not imply that all flight is under ATC control. *VFR* aircraft may operate without ATC contact in most controlled airspace as long as weather conditions will permit them to see and avoid other aircraft.

Cost per Available Seat Mile (CASM) - The unit operating cost of a carrier, also known as unit cost. The cost expressed in cents to operate each seat mile offered. Determined by dividing operating costs by ASMs.

Declared Distances - The distances the airport owner declares available for the airplane's takeoff run, takeoff distance, accelerate-stop distance, and landing distance requirements. The distances are:

- *Takeoff run available (TORA)* - the runway length declared available and suitable for the ground run of an airplane taking off;
- *Takeoff distance available (TODA)* - the TORA plus the length of any remaining runway or clearway (CWY) beyond the far end of the TORA;
- *Accelerate-stop distance available (ASDA)* - the runway plus stopway (SWY) length declared available and suitable for the acceleration and deceleration of an airplane aborting a takeoff; and
- *Landing distance available (LDA)* - the runway length declared available and suitable for a landing airplane.

NOTE: The full length of TODA may not be usable for all takeoffs because of obstacles in the departure area. The usable TODA length is aircraft performance dependent and, as such, must be determined by the aircraft operator before each takeoff and requires knowledge of the location of each controlling obstacle in the departure area.

Delay – The difference between constrained and unconstrained operating time for an aircraft.

Demand Management - a method of controlling airport access by promoting more effective or economically efficient use of existing facilities. The two most prevalent methods are differential pricing and auctioning of landing rights.

Design Aircraft - The Design Aircraft is an aircraft whose dimensions and/or other requirements make it the most demanding aircraft for an airport's facilities (i.e. runways and taxiways), and is used as the basis for airport planning and design. Note that if the airport's facilities are designed to accommodate the Design Aircraft, they can accommodate less demanding aircraft as well. An aircraft can be utilized as the Design Aircraft for an airport if it has or is expected to conduct 500 or more annual operations (250 landings) at that airport.

Disposable Personal Income - personal income less personal tax and non-tax payments. It is the income available to persons for spending or saving.

Downwind - The standard *traffic pattern* leg where traffic flies parallel to the landing runway in the direction opposite that of landing. Airplanes usually land into the wind. In this leg of the pattern, the aircraft has the wind behind it, thus the plane is flying "downwind."

DUATS (Direct User Access System) - Permits pilots with a personal computer to obtain preflight weather data and *flight plans.* Toll-free service is available to all pilots with a current *medical certificate.*

Elevator - An aircraft control surface hinged to the rear of the left and right horizontal stabilizer of the aircraft tail. Changes the aircraft pitch attitude nose-up or nose-down, as during climb or descent. Controlled by pushing or pulling on control yoke or stick.

ELT (Emergency Locator Transmitter) - A radio transmitter activated automatically by the impact of an accident. Emits a warbling tone on the international emergency frequencies of 121.5 MHz, 243 MHz and (newer models) 406 MHz. ELT signals can be received by nearby FAA facilities, aircraft overhead, and search and rescue (SARSAT) satellites.

Enhancement Projects - Various scenic, historic and environmental activities eligible for project funding under the Surface Transportation Program (STP) element of Federal Transportation funding resources.

Federal Aviation Administration (FAA) - The Department of Transportation's agency for aviation. In addition to regulating airports, aircraft manufacturing and parts certification, aircraft operation and pilot certification ("licensing"), the FAA operates *Air Traffic Control*, purchases and maintains navigation equipment, certifies airports and aids airport development, among other activities.

Federal Aviation Regulation (FAR) - Regulations developed by the FAA in order to maintain safety, define standards, and institute uniform practices throughout the industry.

Federal Highway Administration (FHWA) - Division of the U.S. Department of Transportation that administers the funds for highway planning and capital programs.

Federal Transit Administration (FTA) - Division of the U.S. Department of Transportation that administers the funds for transit planning and capital/operating programs.

Final - The last leg of the *traffic pattern* when the aircraft is aligned to fly straight in to the landing runway.

Financing (or Dry) Lease - Lease in which the service provided by the lessor to the lessee is limited to financial equipment. All other responsibilities related to the possession of equipment, such as maintenance, insurance, and taxes, are borne by the lessee. A financial lease is usually non-cancelable, and is fully paid out (amortized) over its term.

Fixed Base Operation or Fixed Base Operator (FBO) - A sales and/or service facility located at an airport, or the person who operates such a facility. An airport-based business that parks, services, fuels and may repair aircraft; often rents aircraft and provides flight training. The term was coined to differentiate FBOs from businesses or individuals without an established place of business on the airport.

Fixed By Function NAVAID - An air navigation aid (NAVAID) that must be positioned in a particular location in order to provide an essential benefit for civil aviation is fixed by function. Exceptions are:

- Equipment shelters, junction boxes, transformers, and other appurtenances that support a fixed by function NAVAID are not fixed by function unless operational requirements require them to be located in close proximity to the NAVAID.
- Some NAVAIDs, such as localizers, can provide beneficial performance even when they are not located at their optimal location. These NAVAIDS are not fixed by function.

Flaps - Hinged surfaces on the inboard rear of wings, deployed to increase wing curvature (and thus, lift), primarily used to control angle of descent and to decrease landing touchdown speeds.

Flight Following - *ATC* radar surveillance of *VFR* flights at pilot request over water or desolate areas. Facilitates search and rescue should it be needed. Service provided only if controller is not too busy with *IFR* traffic.

Flight Plan - Filed by radio, telephone, computer, or in person with *Flight Service Stations*, a record of aircraft number; type and equipment, estimated time of departure and time en route, route and altitude to be flown, amount of fuel and number of persons aboard, home base and contact phone number; and other information.

Flight Plan (IFR) - Mandatory filing (at least one-half hour) before a flight under Instrument Flight Rules. Based on flight plan information, ATC can issue (immediately before departure) an IFR clearance to enter clouds or low visibility conditions for instrument rather than visual flight.

Flight Plan (VFR) - Voluntary filing for cross-country flights under Visual Flight Rules. Its function is for search and rescue use only, and has no air traffic control role.

Flight Service Station (FSS) - FAA weather briefing and flight plan facility which once numbered 361 U.S. locations before most were consolidated into 61 AFSS. It is usually on an airport to handle walk-in traffic. Some still provide AAS (Airport Advisory Services) to local air traffic where volume cannot justify a control tower.

Flight Watch or EFAS - *FSS* priority handling of real-time weather information to airborne flights (rather than for preflight planning) on a single national radio frequency of 122.0 MHz (low altitude).

Fractional Ownership – An aircraft ownership concept whereby multiple companies can partially own an aircraft. A common aircraft management company is used to maintain the aircraft and administer the leasing of the aircraft among the owners. The aircraft owners participating in the program agree not only to share their aircraft with others having an ownership interest in that aircraft, but also to lease their aircraft to other owners in the program.

Frangible NAVAID - A navigational aid (NAVAID) that retains its structural integrity and stiffness up to a designated maximum load, but on impact from a greater load, breaks, distorts, or yields in such a manner as to present the minimum hazard to aircraft. The term NAVAID includes electrical and visual air navigational aids, lights, signs, and associated supporting equipment.

Free Flow - Roadway conditions in which vehicles are almost completely unimpeded in their ability to maneuver within the traffic stream.

Functional Classification - The grouping of streets and highways into classes, or systems, according to the character of service they are intended to provide. Basic to this process is the recognition that roads do not function independently, but rather as a system-wide network of roads.

Fuselage - The main body of the aircraft.

General Aviation (GA) - All civil aircraft and aviation activity except that of the certified air carriers and military operations. GA includes corporate flying and private flying (recreation or personal). The 92% of U.S. aircraft and more than 65% of U.S. flight hours flown by other than major and regional airlines or the military. Often misunderstood as only small, propeller-driven aircraft. Even a large jet or cargo plane operated under FAR *Part 91* can be a general aviation aircraft.

GPS (Global Positioning System) - Satellite-based navigation system operated by Department of Defense, providing extremely accurate position, time, and speed information to civilian and military users. Based on a "constellation" of 24 satellites, GPS will replace ground-based navigation systems *(VOR, ILS)* as the primary worldwide air navigation system in the 21st Century.

Gross Domestic Product (GDP) - the featured measure of U.S. output, is the market value of the goods and services *produced by labor and property located in the United States*. Because the labor and property are located in the United States, the suppliers (that is, the workers and, for property, the owners) may be either U.S. residents or residents of the rest of the world.

Gross National Product (GNP) - the market value of the goods and services *produced by labor and property supplied by U.S. residents*. Because the labor and property are supplied by U.S. residents, they may be located either in the United States or abroad. The difference between GDP and GNP is net receipts of income from the rest of the world.

Hazard to Air Navigation - An object that, as a result of an aeronautical study, the FAA determines will have a substantial adverse effect upon the safe and efficient use of navigable airspace by aircraft, operation of air navigation facilities, or existing or potential airport capacity.

High Occupancy Vehicles (HOV) - Vehicles carrying a specified minimum number of persons, usually three or more. Freeways may have lanes designated for HOV use by car-poolers, vanpools and buses.

ILS (Instrument Landing System) - A precision instrument approach system utilizing radio transmitters at the runway ends which provide precise descent and course guidance to the runway permitting aircraft to land during periods of low ceilings or poor visibility.

Instrument Flight Rules (IFR) - Aircraft operation rules as pre-scribed by Federal Aviation Regulations for flying by instruments. Rules of the road for flights permitted to penetrate clouds and low visibility conditions by reference to cockpit flight instruments and radio navigation. Aircraft must be equipped and pilots qualified and current for IFR flight. Flight plans and ATC clearances are required. Flights are monitored and traffic separated by Air Traffic Control, usually by radar.

Integrated Noise Model (INM) – A computer program typically used for FAR Part 150 noise compatibility planning and for FAA Order 1050 environmental assessment and environmental impact statements.

Intelligent Transportation Systems (ITS) - Electronic, computer and communications technology applied to surface transportation to increase safety, reduce congestion, enhance mobility, minimize environmental impact, increase energy efficiency and promote economic productivity for a healthier economy.

Intermodal - A transportation system connecting or including different modes of transportation.

Intermodal Surface Transportation Efficiency Act of 1991 (ISTEA) - The most recent legislation passed by the U.S. Congress that authorizes Federal funding through 1997 for highway and transit purposes. The Act reinforces MPO responsibilities and provides more flexibility in transportation planning and programming decision-making.

Itinerant Operations - All aircraft operations other than local operations.

KNOT (nautical mile per hour) - Most common measure of aircraft speed. 100 knots equals 115 statute miles per hour. (For mph, multiply knots by 1.15.)

LAAS - Local Area Augmentation System, an enhancement of the Global Positioning System (GPS) providing greater navigation accuracy and system integrity.

Land Use - The manner in which land or the structures on land are used (i.e., commercial, residential, industrial, etc.).

Large Airplane - An airplane of more than 12,500 pounds (5 700 kg) maximum certificated takeoff weight.

Leases - Contracts granting use of equipment (aircraft) for a specified time in exchange for payment, usually in the form of rent. The owner of the leased property is called the lessor, the user the lessee.

Lease Purchase Agreement - Agreement providing that portions of lease payment may be applied toward the purchase of the property under lease.

Length of Hop - The average distance of a flight or stage length.

Level of Service (LOS) - The quality of flow in the moving stream of people or vehicles. Typically, ranges from LOS A (free flow traffic) to LOS F (stop-and-go unacceptable conditions).

Load Factor (LF) - The percentage of seats filled. Determined by dividing RPMs by ASMs as a percentage (%).

Local Operation - Operations performed by an aircraft that:

- Operates within the local traffic pattern or within sight of the airport,
- Are known to be departing for or arriving from an Airport within a 20-mile radius of the Airport in question, or
- Execute practice maneuvers such as touch and goes or simulated instrument approaches at the airport.

The majority of local operations are conducted by based aircraft.

Long Range Transportation Plan - A 15 to 20 year forecast plan that must consider a wide range of social, environmental, energy and economic factors. The plan addresses overall regional goals and how transportation can best meet those goals within financial limits.

Medical, Third Class - Upon examination by an FAA-designated Aviation Medical Examiner (AME) for general health, eyesight and hearing, a Third Class Medical allows the pilot to exercise the privileges of a *Recreational* or *Private* pilot certificate. Not for flight "for compensation or hire." It is valid for three years (pilots younger than 40) or two years (age 40+).

Medical, Second Class - Allows pilot to exercise the privileges of a *Commercial* pilot certificate "for compensation or hire" for one year then, if not renewed, reverts to Third Class medical.

Medical, First Class - Allows pilot to exercise the privileges of the Airline Transport Pilot *(ATP)* certificate for six months. If not renewed, reverts to a Second Class medical, then to a Third Class medical.

Metropolitan Planning Area - The region in which the MPO carries out its transportation planning responsibilities and is designated as such by the MPO and the Governor in accordance with ISTEA regulations.

Metropolitan Planning Organization (MPO) - The agency designated by the Governor to administer the federally required transportation decision-making process in urbanized areas with over 50,000 in population.

MOA (Military Operations Area) - Airspace, depicted on navigational charts, in which military flight operations (training and practice combat) are conducted. May be transited by *VFR* civilian traffic, but special vigilance is recommended. (See also *Restricted Area*)

Mode - A particular form of travel, for example, walking or traveling by automobile, transit or bicycle.

Mode A - The operating mode of onboard radar *transponders* that transmits a return radio signal to enhance an aircraft's radar return and identify it with one of 4,096 controller-assigned numerical codes.

Mode C - The *transponder* operating mode that also reports aircraft altitude by transmitting data from an encoding *altimeter*

Mode Split - The process by which the number of trips that will be made by two or more modes of transportation is surveyed or estimated.

Movement Area - The runways, taxiways, and other areas of an airport that are used for taxiing, takeoff, and landing of aircraft, excluding loading ramps and parking areas.

MSL (Mean Sea Level) - Altitude expressed as feet above sea level, rather than above local terrain *(AGL)*. To ignore varying terrain elevations, all navigational altitudes and barometric altimeters are based on height above mean sea level. Only radar altimeters, which measure the distance between the aircraft and the ground at low altitudes, indicate actual height above the ground.

Multilateral Aviation Agreement - an agreement for air service among more than two nations (see "Freedoms of the Air").

National Airspace System (NAS) - The common system of air navigation and air traffic control encompassing communications facilities, air navigation facilities, airways, controlled airspace special use airspace, and flight procedures authorized by FAR's for domestic and international aviation.

National Highway System (NHS) - A 155,000-mile system of roads, authorized through ISTEA. Comprised of Interstate highways and roads designated as most important to interstate travel, national defense, intermodal connections, and international crossings. Congressional approval of the NHS system was formalized by the National Highway System Act of 1995.

National Transportation Safety Board (NTSB) - The independent federal agency charged with investigating and finding "probable cause" of transportation accidents.

Nautical Mile (NM) - The unit measure of distance in both nautical and aeronautical context. A nautical mile equals 1.15 statute miles (6,080 feet). The measure of speed in regards to nautical miles is known as KNOTS (nautical miles per hour).

Network Airline - An airline that operates a hub-and-spoke system.

NMAC (Near Mid-Air Collision) - Defined by FAA as a potential collision situation between aircraft within 500 feet of each other.

N-NUMBERS - Federal Government aircraft registration numbers. U.S.-registered aircraft numbers begin with "N," Canadian numbers with "C" or "CF," German numbers with "D," United Kingdom numbers with "G," French numbers with "F", Japanese numbers with "JA," etc.

Non-Attainment Area - Any geographic region that has been designated as non-attainment due to transportation related pollutant(s) that violates the national ambient air quality standard. The Clean Air Act requires that these areas perform air quality analyses and determinations to ensure conformity.

Non Towered Airport - An airport without a control tower - the majority of America's 13,000 airports. Only 680 airports have control towers. Non-towered airports are far from being "uncontrolled." Pilots follow *traffic pattern* procedures and self-announce positions and intentions using the *Common Traffic Advisory Frequency (CTAF),* usually called the *UNICOM* frequency.

Notice to Airmen (NOTAM) - A notice identified either as a NOTAM or an Airmen Advisory containing information concerning the establishment, condition, or change in any component of, or hazard in, the National Airspace System, the timely knowledge of which is essential to personnel concerned with flight operations.

Object - Includes, but is not limited to above ground structures, NAVAIDs, people, equipment, vehicles, natural growth, terrain, and parked aircraft.

Object Free Area (OFA) - An area on the ground centered on a runway, taxiway, or taxilane centerline provided to enhance the safety of aircraft operations by having the area free of objects, except for objects that need to be located in the OFA for air navigation or aircraft ground maneuvering purposes.

Obstacle Free Zone (OFZ) - The OFZ is the airspace below 150 feet (45 m) above the established airport elevation and along the runway and extended runway centerline that is required to be clear of all objects, except for frangible visual NAVAIDs that need to be located in the OFZ because of their function, in order to provide clearance protection for aircraft landing or taking off from the runway, and for missed approaches. The OFZ is sub-divided as follows:

- *Runway OFZ*. The airspace above a surface centered on the runway centerline.
- *Inner-approach OFZ.* The airspace above a surface centered on the extended runway centerline. It applies to runways with an approach lighting system.
- *Inner-transitional OFZ*. The airspace above the surfaces located on the outer edges of the runway OFZ and the inner-approach OFZ. It applies to runways with approach visibility minimums lower than 3/4-statute mile (1 200 m).

Obstruction to Air Navigation - An object of greater height than any of the heights or surfaces presented in Subpart C of Code of Federal Regulation (14 CFR), Part 77. (Obstructions to air navigation are presumed to be hazards to air navigation until an FAA study has determined otherwise.)

Operating Lease - Type of lease, normally involving equipment, whereby the contract is written for considerably less than the life of the equipment, and the lessor handles all maintenance and servicing; also called service lease. Most operating leases are cancelable, meaning the lessee can return the equipment if it becomes obsolete, or is no longer needed.

Operation - A take-off, landing or touch-an-go of an aircraft. FAA ATCT operations include all radio contacts with an aircraft, regardless of whether or not they are taking off or landing. Operations used for planning purposes include only takeoffs, landings and touch and goes (which count as 2 operations).

Origination/Destination (O&D) - A measure of the point of origination of a passenger to the final destination. It is the true trip of the passenger, although the passenger may change flights and planes at least once during the journey. It allows carriers to determine where their true business lies.

PART 91, 121, 125, 135 - The parts of Federal Aviation Regulations (*FARs*) covering non-commercial operations (Part 91), major scheduled air carriers (*Part 121*), commuters (*Part 125*), non-scheduled carriers and air taxis (*Part 135*).

PART 61, 141, 142 - The parts of *FARs* covering pilot certification and flight school operations: the pilot certification and standard flight school (Part 61), the integrated curriculum type school (Part 141) requiring slightly fewer flying hours, and a new Part 142 program allowing replacement of more flight time with advanced flight simulators.

Passenger Haul (PAX length of haul) - The average distance flown per passenger. It includes the total distance traveled from connecting flights. Measured in terms of miles.

Peak - The period during which the maximum amount of travel occurs. It may be specified as the morning (a.m.) or evening (p.m.) peak.

Person Trip - A trip made by a person from a single origin to a single destination.

Personal Consumption Expenditures (PCE) - goods and services purchased by U.S. residents. PCE consists mainly of purchases of new goods and of services by individuals from private business.

Personal Income - the income received by persons from all sources—that is, from participation in production, from both government and business transfer payments, and from government interest (which is treated like a transfer payment).

Pilot Weather Report (PIREP) - Voluntary pilot observation of inflight weather conditions radioed to *ATC* or *FSS.* Information used by other pilots to avoid adverse weather and by National Weather Service to amend or update forecasts.

Positive Control Area - (See *CLASS A Airspace*)

Private Pilot - The Private pilot certificate allows flying passengers for personal transportation and business. Requires the pilot to be at least 17 years old, have a minimum of 40 hours of flight experience and training (35 hours under *Part 141*), and pass at least a *Third Class Medical* exam, a written exam and flight test. May not "fly for hire or compensation" but may share expenses equally with passengers.

Precision Approach Category I (CAT I) Runway - A runway with an instrument approach procedure which provides for approaches to a decision height (DH) of not less than 200 feet (60 m) and visibility of not less than 1/2 mile (800 m) or Runway Visual Range (RVR) 2400 (RVR 1800 with operative touchdown zone and runway centerline lights).

Precision Approach Category II (CAT II) Runway - A runway with an instrument approach procedure which provides for approaches to a minima less than CAT I to as low as a decision height (DH) of not less than 100 feet (30 m) and RVR of not less than RVR 1200.

Precision Approach Category III (CAT III) Runway - A runway with an instrument approach procedure that provides for approaches to minima less than CAT II.

Prohibited Area - An airspace area where flight is prohibited except by prior arrangement with the controlling agency. An example is the P-56 area over downtown Washington, D.C., prohibiting flight over the White House.

Pure Freighter Aircraft - An aircraft that is designed to carry freight. This type of aircraft can transport larger and oddly shaped items that cannot fit into the cargo area of a passenger aircraft.

Recreational Pilot - A pilot certificate requiring less training than a Private certificate. Privileges limited accordingly to flight within 50 nautical miles of base, carrying no more than one passenger; using non-tower airports and flying during daylight hours only unless restrictions are removed through further training. May not share expenses. Few new pilots currently choose the recreational certificate.

Regional Airline - Commuter airline that typically operates in a specific region. Most regional airline traffic feeds network carriers.

Regional Jets (RJs) – A new generation of commercial jets with fewer than 100 seats. On many routes, RJs are replacing turboprop aircraft, which have been unpopular with many passengers. Some large carriers have scope clause agreements with their pilots' unions that limit the number of RJs that can be used by the commuter feed carriers that operate them in conjunction with the large airline.

Restricted Area - Airspace that (when "Active" or "Hot") usually excludes civilian aircraft. Examples: airspace for rocket flights, practice air-to-air combat or ground-based artillery practice. Temporary restricted areas are established for events such as forest fires, natural disasters or major news stories. Flight through a restricted area may be authorized by the "controlling agency" or by *FAA*.

Revenue per Available Seat Mile (RASM) - The revenue generated for each available seat mile operated, expressed in cents. Revenue divided by ASMs.

Revenue Passenger Miles (RPM) - The principal measure of the airline passenger business. It represents the number of paying passengers flown by the distance flown.

Revenue Passenger Kilometers (RPK) - The number of passengers multiplied by the number of kilometers they fly.

Revenue Ton Kilometers (RTK) - The number of tons carried multiplied by the number of kilometers flown.

Revenue Ton Miles (RTMs) - The revenue generated for each ton-mile operated.

Reliever Airport - An airport designated as having the primary function of relieving congestion at a commercial airport and providing more general aviation access to the overall community. Reliever Airports are allowed to receive AIP (federal) funds for improvement.

Right-of-Way (ROW) - Land corridors needed for the construction of highways, transit facilities, railroads, etc.

Rudder - Aircraft control surface attached to the rear of the vertical stabilizer (fin) of the aircraft tail. Forces the tail left or right, correspondingly "yawing" the aircraft right or left. Rudder movement "coordinates" with the banking of wings to balance a turn. Controlled by left and right rudder (foot) pedals.

Runway (RW) - A defined rectangular surface on an airport prepared or suitable for the landing or takeoff of airplanes.

Runway Blast Pad - A surface adjacent to the ends of runways provided to reduce the erosive effect of jet blast and propeller wash.

Runway Protection Zone (RPZ) - An area off the runway end to enhance the protection of people and property on the ground.

Runway Safety Area (RSA) - A defined surface surrounding the runway prepared or suitable for reducing the risk of damage to airplanes in the event of an undershoot, overshoot, or excursion from the runway.

Sale and Leaseback - Form of lease arrangement in which a company sells an asset to another party - usually an insurance or finance company, a leasing company, a limited partnership, or an institutional investor - in exchange for cash, then contracts to lease the asset for a specified term. Such arrangements frequently have tax benefits for the lessee. A company generally opts for the sale and leaseback arrangement as an alternative to straight financing, when the rate it would need to pay a lender is higher than the cost of rental, or when it wishes to show less debt on its balance sheet.

See-and-Avoid -The *FAA* requirement that all pilots are ultimately responsible for separation from other aircraft when visual conditions permit spotting traffic. Even *IFR* flights when operating in visual weather conditions or *VFR* flights being issued radar advisories are responsible for visual scanning to see-and-avoid other traffic.

Separation - Spacing of aircraft to achieve their safe and orderly movement in flight and while landing and taking off.

Scope Clause - Provisions in US major airlines' pilot contracts that impose limits on the operation of jet airplanes used by regional "partner" airlines. Limits on seat count (generally 70 seats or less), weight, cruise speed, or ratio of regional jets to standard jets, are the most common provisions.

Shoulder - An area adjacent to the edge of paved runways, taxiways, or aprons providing a transition between the pavement and the adjacent surface; support for aircraft running off the pavement; enhanced drainage; and blast protection.

Slip - An aircraft control technique with wings banked one way and rudder deployed for the opposite turn. Aircraft flies slightly sideways, increasing drag to make it descend faster without increasing forward speed. Also one of two control configurations used for crosswind landings when the rudder must counteract the turning effect of banking into a crosswind to neutralize the wind's effect.

Small Airplane - An airplane of 12,500 pounds (5 700 kg) or less maximum certificated takeoff weight.

Solo - After typically 12-20 hours of initial flight training, qualified student pilots are permitted to undertake some flights to build experience and confidence without a flight instructor on board. Requires the written endorsement of the student's flight instructor and a *Third Class Medical* certificate. First solo, a major event for any pilot, is traditionally three takeoffs and landings at the student's home airport.

Special Use Airspace (SUA) - All airspace in which restrictions or prohibitions to flight are imposed for military or government needs (See *MOA*, *Restricted Area, Prohibited Area*).

Spin - An aerodynamic condition in which the wings have lost lift and the aircraft follows a descending corkscrew flight pattern in autorotation. Aircraft must be stalled for a spin to occur; this is usually the result of "crossed" flight controls (uncoordinated rudder) causing residual lift on one wing during the stall.

Squawk - (NOUN) The radio transmission of the radar *transponder* onboard an aircraft. (VERB) The *ATC* instruction to the pilot to set one of 4,096 possible codes to identify the aircraft on controller radar. All *VFR* flights squawk code 1200 except when receiving radar advisories or when instructed otherwise by ATC.

Stage Length (see length of hop) - The average distance flown per flight.

Stall - Purely an aerodynamic condition - nothing to do with engine operation. Occurs when lift-producing airflow over the wings is disrupted or lost because angle of wings to airflow (angle of attack) is too high. Most commonly occurs when a pilot doesn't maintain sufficient airspeed in a climb or turn. Student pilots are trained in stall prevention, recognition and recovery.

Statute Mile - A mile measuring 5,280 feet (in contrast to a nautical mile of 6,080 feet).

Stopway (SWY) - A defined rectangular surface beyond the end of a runway prepared or suitable for use in lieu of runway to support an airplane, without causing structural damage to the airplane, during an aborted takeoff.

Student Pilot - A pilot who is training for a *Private Pilot* certificate, either before or after the first solo. A student must obtain a *Third Class Medical* certificate through an examination by an FAA-designated Aviation Medical Examiner before being allowed to fly solo in a powered aircraft. The medical certificate for a student pilot has a student "license" printed on the back.

Surface Transportation Program (STP) - A capital-funding program legislated by ISTEA for a variety of highway, transit, pedestrian and bicycle projects.

Taxi - To operate an airplane under its own power on the ground, except the movement incident to actual takeoff and landing.

Taxilane (TL) - The portion of the aircraft parking area used for access between taxiways and aircraft parking positions.

Taxiway (TW) - A defined path established for the taxiing of aircraft from one part of an airport to another.

Taxiway Safety Area (TSA) - A defined surface alongside the taxiway prepared or suitable for reducing the risk of damage to an airplane unintentionally departing the taxiway.

TCA (Terminal Control Area) - (See *CLASS B Airspace*.)

TCAD - A proprietary low cost anti-collision system detecting and alerting pilots to nearby transponders but not providing evasive instructions or coordination with other aircraft.

TCAS (Traffic Alert and Collision Avoidance System) - A cockpit system to detect other transponder-equipped aircraft, alert pilots, and command/coordinate evasive action between aircraft.

Terminal Area Capacity - The ability of the terminal area to accept the passengers, cargo, and aircraft that the airfield accommodates. Individual elements within terminal areas must be evaluated to determine overall terminal capacity. Terminal elements included in the analysis are: airline gate positions, airline apron areas, cargo apron areas, general aviation apron areas, airline passenger terminals, general aviation terminals, cargo buildings, automobile parking and aircraft maintenance facilities.

Threshold (TH) - The beginning of that portion of the runway available for landing. In some instances the landing threshold may be displaced.

Displaced Threshold - The portion of pavement behind a displaced threshold may be available for takeoffs in both directions and landings from the opposite direction.

Relocated Threshold - The portion of pavement behind a relocated threshold is not available for takeoff or landing. It may be available for taxiing of aircraft.

Touch and Go - A training operation in which a landing approach is made, the aircraft touches-down on the runway, but does not fully reduce speed to turn off the runway. Instead, after the landing, full engine power is applied while still rolling and a takeoff is made, thereby practicing both maneuvers as part of one motion. It counts as two separate aircraft operations.

Track - The flight path of an aircraft over the surface of the earth.

Traffic Analysis Zone (TAZ) - The smallest geographically designated area for analysis of transportation activity.

Traffic Pattern - A standard rectangular flight pattern around the landing runway at an airport. Includes 45-degree or crosswind entry to the rectangle, with downwind, base and final legs as sides of the rectangle. Standard are 90-degree left turns around the rectangle (non-standard right-hand traffic pattern is noted in Airport Facility Directories) with downwind flown at a specified altitude, usually 1,000 or 1,500 feet above the airport elevation. At airports with a control tower, the pattern may be modified or shortcut according to *ATC* instructions. Traffic patterns are followed by aircraft in order to exit the airport area after takeoff in an orderly fashion, and to enter an Airport area and ultimately land, also in an orderly fashion.

Transfer Payments - transfer payments to persons and *transfer payments to the rest of the world (net)*. The latter consists of U.S. Government military and nonmilitary grants in cash and nonmilitary grants in kind to foreign governments and of U.S. Government transfers, mainly retirement benefits, to former residents of the United States.

Transponder - A special onboard 1090 MHz radio transmitter to enhance and code an aircraft's radar return. When interrogated by ground radar, it transmits a return signal which controllers can use to identify and tag the flight on their computerized video display radar screen. Paired with an altitude encoder, "*Mode C*" transponders also transmit the aircraft's altitude. All aircraft flying in *Class B* airspace or higher than 10,000' are required to have *Mode C* transponders.

Transport Airport - A transport airport is an airport designed, constructed, and maintained to specifically serve airplanes in Aircraft Approach Category C and D. Please refer to the definition for Aircraft Approach Category. Airports, which accommodate Category C and D aircraft on a semi regular basis, are not necessarily Transport Airports.

Transport Category Aircraft - Aircraft with a maximum Gross takeoff weight of 12,500 pounds or more.

Transportation Demand Management - Programs and policies to reduce peak demand for transportation and to maximize efficient use of the transportation system. Such strategies may include HOV lanes, ride sharing and vanpooling, and congestion pricing.

Transportation Enhancement Program (TEP) - Federal program which provides capital funds for "non-traditional" transportation projects such as bicycle and pedestrian facilities, historic preservation of transportation facilities, and transportation-related landscaping and scenic beautification.

Transportation Improvement Program (TIP) - A capital investment program prepared by the MPO cooperatively with the State and transit operator that prioritizes transportation projects to be implemented with Federal funds over a five year period.

Transportation Network - A schematic representation of the roadway or transit system via a series of links and nodes in a computer database.

Travel Forecasting - The technical process of estimating the number of future users by mode of a system and their particular travel times and routes.

Trip Assignment - The process of allocating highway and transit trips among the different facilities included in a network.

Trip Distribution - The process of estimating the travel between traffic analysis zones.

Trip Generation - The process of estimating trips that will be produced and/or attracted to a geographic unit based on the population and employment characteristics of that unit.

Trip Length - The average length of journey in terms of miles for a passenger.

TRSA (Terminal Radar Service Area) - Radar service that assists with traffic sequencing in some *Class D* airspace. Pilot participation is voluntary.

Turboprop - An airplane using a turboprop engine, a jet rather than piston engine connected to a propeller. Such aircraft can be single- or multi-engine. Turboprop engines are increasingly used when more horsepower is needed for speed or payload than the 300-400 horsepower available from current light-aircraft piston engines. They typically serve narrow markets, and feed major carrier hubs.

Uncontrolled Airport - *(see Nontowered Airport)*

UNICOM A common, multi-purpose radio frequency used at most *nontowered airports* as the *Common Traffic Advisory Frequency.* AOPA coined the term (derived from the words "universal communications") in the 1950s. UNICOM is also used by a *Fixed*

Base Operator for general administrative uses, including fuel orders, parking instructions, etc. Originally 122.8 MHz universally, now includes 122.7,123.0 and other frequencies.

Unit Cost - The cost per available seat mile (ASM). Obtained by counting total operating costs and dividing it by the ASMs. Expressed in cents.

Unit Revenue - The average revenue generated per available seat mile (passenger revenue/ASMs), expressed in cents.

Urbanized Area - An area with a population of 50,000 or more designated by the U.S. Census Bureau.

Utility Airport - A utility airport is an airport designed, constructed, and maintained to serve smaller (single and twin-engine) airplanes.

Vehicle Miles of Travel (VMT) - The amount of vehicle travel on a designated set of roadways multiplied by the total mileage of those roadways.

VFR Conditions - Basic weather conditions prescribed for flight under Visual Flight Rules; usually implies a ceiling of at least 1000 feet and a forward visibility of three miles or more.

Visibility, Prevailing - The horizontal distance at which targets of known distance are visible over at least half of the horizon. It is normally determined by an observer on or close to the ground viewing buildings or other similar objects during the day and ordinary city lights at night.

Visual Flight Rules (VFR) - "See and be seen" flight rules. Each pilot is responsible for the safe spacing and proper operation of his aircraft. Under VFR, a pilot is not required to file a flight plan or be in constant radar and communication contact with air traffic control. Visual flight rules are determined by weather and require a ceiling of at least 1,000 feet and visibility of at least 3 miles. VFR weather minimums for *controlled airspace* require at least a 1,000-foot ceiling and three miles visibility except for "Special VFR" clearances to operate "clear of clouds." Navigation may be by pilotage (reference to ground landmarks), dead reckoning (courses calculated from map plots), radio navigation, or more commonly, a combination of all three.

VFR, MARGINAL - Weather of less than 3,000-foot ceiling and five miles visibility but above the required "1,000 and three."

Visual Runway - A runway without an existing or planned straight-in instrument approach procedure.

VFR Traffic - Aircraft traffic operated solely in accordance with Visual Flight Rules.

Volume - The number of vehicles that actually pass through a given mile of road; can also be applied to transit or bicycle/pedestrian paths.

VOR (VHF Omnidirectional Range) - Ground- based radio navigation aid. More than 1,000 VORs electronically define Victor Airways and Jet Airways, "highways in the sky." Most IFR and many VFR flights follow airway routes.

WAAS (Wide Area Augmentation System) - An enhancement to the *GPS* system providing greater navigation accuracy and system integrity and permitting GPS to be used for precision instrument approaches to most airports.

Wake Turbulence - Turbulent air condition caused by small, tornado-like horizontal whirlwinds trailing an aircraft's wingtips (wingtip vortices). Wake turbulence associated with larger aircraft flying at slow speeds (as on take-off or landing approach) is the most severe and can cause loss of control for smaller aircraft following close behind. Controllers use defined separation standards to avoid the problem for take-off, landing, approach and departure operations. This turbulence is greatest when the aircraft is taking off and landing.

Wet (or ACMI) Lease - A lease in which not only the aircraft is provided, but also other services are included, as well as hull insurance, crews, and maintenance guarantees.

Wind Coverage - Wind coverage is the percent of time for which aeronautical operations are considered safe due to acceptable crosswind components.

Wind Shear - Large changes in either wind speed or direction at different altitudes that can cause sudden gain or loss of airspeed. Especially hazardous when aircraft airspeeds are low on take-off or landing.

Yield (revenue per revenue passenger mile) - A function of passenger revenue generated, divided by the revenue passenger miles generated. It is expressed in cents per mile, and measures the average level of fares at which the airline is selling its product.

<u>Yield Management</u> - Also known as revenue management, the process airline use to set prices for a flight. The goal is to find the mix of seat prices that produces the most revenue.

<u>Yield Management Systems</u> - Computer-managed systems that airlines have installed and are constantly perfecting, to better enable them to manage price and seat inventories, enabling the carriers to sell the maximum number of seats at the most productive yield mix.